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ABSTRACT

Designed to assist teachers who are not familiar with computer applications in elementary education, this guide provides information on personal skill development, computer terminology, software organization and evaluation, and troubleshooting. A tentative set of computer education objectives is outlined, and examples and strategies for effective classroom use are provided. Various programs and applications are detailed, including computer-assisted learning, simulation programs, problem solving and flowcharting, LOGO, word processing, keyboarding, database management, telecommunications and electronic mail, and electronic spreadhseets. The text includes one article reprinted from The Computing Teacher and is supplemented by worksheets for student use, charts, diagrams, and illustrations. Lists of eight recommended magazines and journals, 32 recommended software programs, and 14 recommended books are also provided. (EW)

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the letters of the alphabet. Draw a picture.
to your Grandparents. Prepare a petition for cir-
Teach someone how to use the computer. Help your Dad
inventory of his belongings. Keep a record of changing
at The Bay or Co-op. Write a "Choose your Own Adventure" story.
Make a maze. Print copies of your school or class chant and
share them. Design a building. Map out a new floor plan.
Draw a flow chart to explain a school day to a creature
from outer Plan a trip. Solve a puzzle. Make
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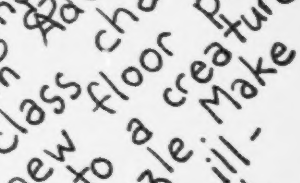

Computer Education: Getting Started

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1985

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Anne Davies
September, 1985

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Computers In Education

Introduction

This guide is intended to assist and advise teachers in the N.W.T. with regards to computers in education. A formal curriculum has not been developed. A formal policy has not been set. Rather, this guide has been compiled to assist teachers in meeting an emerging need. It is not intended to be comprehensive but rather, it is a collection of information of concern and interest to educators, a tentative outline of computer education objectives, and some examples and strategies for using computers in the classroom.

This guide focuses on introducing students to computers. This aspect of educational computing is not intended to be viewed as a final goal. The information provided in this guide will hopefully serve as a bridge to our eventual goal of assisting teachers to use computers as tools for effective teaching and teaching students to use computers as tools for effective learning.

General Overview

"The purpose of Education is to provide for all people the opportunity for maximum development of their attitudes, skills and competencies along with an understanding and appreciation of the sum total of human experience. Such development should enable each individual to choose freely between different courses of action in such a manner that he or she can live a satisfying personal life while discharging his or her responsibilities as a participating member of a complex society."

Excerpt taken from
Philosophy of Education
in the Northwest Territories, 1978

The emergence of computers has taken place very rapidly and while many educators push at the leading edge of educational computing, no one really knows where we will end up or when we will arrive. This is not intended to give any support to those who may say that we should just jump off the 'bandwagon' now and wait for everyone to determine where it's going before we get on again. In fact, educators need to be vocal members of the 'bandwagon' and start influencing its direction even more. We need good efforts which start small and grow sensibly. We need to use the hardware, evaluate the software, and discover appropriate and useful applications for computer technology. Just as learning how to read and write and do arithmetic can change an individual's life and shape his/her future, so can computer literacy shape an individual's ability to be free to choose and experience widely.

Educators teach and lead students' learning in many areas. We know that reading and writing are difficult things to learn but literacy is important because it gives individuals freedom. We know that mathematics is important and mathematical 'literacy' gives individuals their freedom. Computer literacy takes time and practice to learn but it also puts students and teachers in control of the computer and, in turn, in control of the technology. It can give individuals their freedom. What is Computer Literacy? It is knowing what a computer can do and how to tell the computer to do what **YOU** what it to do.

The arrival of computers into educational circles is different from any other changes which educators have encountered. Three major differences between the arrival of computers and all other major changes in schools are:

1. The 'innovation' is not arriving on the scene with trained staff ready to greet it. Most educators did not have the opportunity to learn what to do with computers when they learned how to be teachers.
2. The money is not available to purchase what may be thought to be a full complement of equipment immediately.
3. There is no historical precedent with lots of prototypes that make it easy to select the "best" plan for the particular situation. (Cory, S., 1983)

As a result of this innovation being greeted at the doors of education by enthusiastic but largely untrained teachers, teachers have tremendous inservice needs. Unlike any other subject area, educators have absolutely no experience using or teaching with computers. If a teacher runs into trouble teaching a lesson it can always be taught the way the teacher remembers it being taught. Teachers have a 'bag of tricks' by virtue of having been students for years. However, none of us had microcomputers in our classroom when we were in elementary school and therefore few of us have yardsticks or benchmarks to use as comparisons when we work with computers in our classrooms now.

Until enough hardware has been purchased, enough software been used and enough time spent learning to understand the possibilities computers have in the classroom, teachers and administrators may not know what exactly can be done with computers and therefore what impact they can have. Along with the arrival of *hardware* and *software* into our schools must come *innovation* on the part of educators. Educators must examine possibilities in light of the curricula, the students and the community . As more equipment and software arrive, teachers must be flexible. All this is easier if you know where you hope to go. In order to make appropriate decisions along the way, educators must understand (and agree with) the school's philosophy of education and it's goals.

The lack of prototypes among which educators can select, means that we are essentially stepping off into deep waters. Yet, while it is true that there are no historical precedents for using computers in schools, there are lots of school districts throughout North America experimenting with the use of computer technology and from whom we can learn. There are areas in the United States which boast a computer for every child (Gr.6 and up). There are many areas in Canada which have curricula in place and have ongoing pilot projects. In the Territories there are pockets of activity from which we can learn. There is no reason not to make a beginning, no matter how small. We must all learn from our mistakes and our successes.

There are two major strands of computer study which involve teaching ABOUT computers and teaching WITH computers. Prior to successful implementation of computer study and study with computers there are three major areas which require immediate and ongoing work. They are: teacher inservice, curriculum and program development and software evaluation.

- Educators need general inservice in order to be equipped and able to teach WITH computers and to a lessor degree, ABOUT computers.
- Curriculum and program development must proceed and be continuously updated as the role of computers changes and as computers themselves change. Further, as we learn more about the possibilities for computer use in the school, other subject area curricula must change to reflect the changing world. This is not to say that we should hold all development until we see what the future will bring but rather, that the initial stages of growth and confusion need to be a part of all development. In fact, learning from mistakes and successes, are the perfect bywords for computer curriculum development. As long as developers and educators are aware of good pedagogy, of their philosophy and their objectives, then any errors made will not be devastating.
- Software evaluation needs to be done in terms of the hardware available and in terms of correlating its use with the present subject area curricula. The amount of software required to teach ABOUT computers is more limited in scope then what is required to teach WITH computers. As computers become more common the focus of instruction will change. The benefits of software committment in the area of teaching WITH computers is much greater in many ways since the use of computers as tools in school, home and the workplace will continue to grow exponentially.

Computers offer a challenge to educators. Let's get started!

Teachers and Their Personal Computer Education

Teaching is difficult enough without the added pressure of learning how to not only use a computer but teach with one. Computers can be intimidating to first-time users, particularly if you're required to use one! Take heart! It's been compared to riding a bicycle. Once you learn there is no looking back. But, you can't almost know how to ride a bicycle. You either know how to ride one or you don't. The breakthrough you experience will take you to new heights of knowledge.

There are two ways to learn computing. Either with help or without. The first is highly preferable but there may not be any computer users in your particular patch of the territories. The following suggestions are for people who undertake their own inservice with a friend/tutor and for those who undertake it alone.

Learning With a Tutor

*Ask your tutor to show you just enough to get started. When you feel saturated, say so! You can come back for more instruction later.
*The best program to start with seems to be a word processing program. We all have a use for word processing and it's an easy way to master the machine.
*Play with the software and the machine before you start reading through all the manuals and books at your disposal. (Hard to learn how to ride a bike by looking/reading a book!)
*Don't try to learn it all in a linear fashion. Follow your interests and your curiosity.
*Your time is better spent learning how a program works than memorizing procedures.
*Ask for another lesson when you feel ready. Try to start by asking the questions you want answered after all your playtime with the machine.

Learning Without A Tutor

*Are you sure you're all alone. Have you checked around the community for a potential `expert'? Even a beginner can get you started and save you hours of reading and experimentation. Check out the community council office or the adult education office. Even if it's a different machine an introduction can give you lots of valuable hints.
*Learn the basics of how to care for diskettes, store files and make back up copies of programs before trying to learn the ins and outs of more complicated programs.
*Spend some time playing with `children's' software. They can give your some idea as to the structure of other programs.
*Start with disks that can be easily replaced so you won't be operating under the fear of losing someone's expensive program.
*Get your hands on a word processing program as early as possible and spend lots of time writing letters to all your close and distant friends and relatives.
*Remember and believe that you don't have to be an expert on any program to be able to use it. Be only as good as you have to be initially and then if you're really keen you can take it farther later.

*Try to match cause and effect. What was the problem and what do you think you did? Try it again. Can you make the same thing happen twice? Was it really an error or did you just learn something new? (One of my most valuable assets is a huge mental list of mistakes I've made. When someone needs help I ask them what's happening and compare that to my mental list. I then ask them what they think they did. I can usually help them figure it out. After all, I've made just about every mistake possible!)

*Try to get a feel for generalities. Some things are the same or very similiar no matter what program you're using. Watch for these so every situation won't be an entirely new one for you to tackle!

*Learn to type! Everything will seem to go very slowly until you learn the basics of typing. Don't be shy! Use a children's typing program. Some of them are excellent. Once you get going you'll be amazed at your speed. After all, when you're able to edit easily, errors hardly count!

*Use good software. If you find the software difficult to use, chances are good that it's not the best software!

Computers at -40°
Feeling for Generalities
Bears on Computers
E. Lorenz

An Introduction To Some Computer Terminology

Anyone attempting to select equipment needs to understand and be able to discuss the relative merits and limitations of the various types of computer hardware using the accepted terminology. To assist beginners in this regard, I have attempted to summarize some of the more important terminology and concepts.

A computer system can be thought of as having three components:

-input devices

-Central Processing Unit (CPU) with memory

-output devices.

The three components work together to provide the user with a complete system. It is not necessary to have any more than one of each component however it is typical to have a variety of devices that together form a system that best meets your needs. Most often the system develops and expands over time. The following descriptions are brief but should provide the reader with a basic understanding of the components.

CPU

The CPU (Central Processor Unit) is the processor chip, the brain of the computer. It is the part of the computer in which calculations and logical operations are performed. It, in a sense, is the part of the computer which controls the operation of the entire computer system.

All CPU's are not the same. The differences are important where portability of software is concerned. If the CPU'S are different it is almost certain that the programs from one will not run on the other.

Memory

In general, the most common microcomputers today have 64k or 128K. (1K - 1024 BYTES of memory. A BYTE can be thought of as one character, therefore we would find 1024 characters could be stored in 1K of memory.) It is possible to purchase microcomputers with as little as 8k or 16K however most purchased programs now require a minimum of 64K with newer programs using 128K.

There are two types of memory users should consider, ROM and RAM. ROM stands for Read Only Memory, and represents permanent storage within the computer. It is not as easily erased and in fact one wouldn't usually set out to change ROM in any way. Usually one is not concerned with how much ROM there is as with what ROM can do. With some systems only basic programs are stored in ROM while with other models a wide variety of programs are offered.

RAM refers to Random Access Memory. It represents the computer's working storage area. This area stores the programs that the user provides. RAM is not permanent so when the computer is turned off the contents of RAM are lost. RAM can also be changed or replaced by the user. It is this feature that lets RAM load and run different programs.

The more memory your machine has the more it costs. The amount of memory you need depends on what you wish to do but an important consideration is to purchase the equipment that is going to run the software you hope to use. Two years ago 64K seemed like a tremendous amount of memory and I felt that my 64K Apple IIe would last for a long while. Well, last spring I boosted the memory of the Apple to 128K and purchased a Macintosh with 512K. I hope current levels of memory available to me now will be enough for a few years. We'll need to expand the memory of our machines during the next few years so they'll be able to run the full range of application software that we'll wish to use.

Monitors

The type of monitor you purchase depends on the uses to which it will be put in your classroom or your school. Many of the educational programs require a colour monitor yet the word processing and other application programs require a green or amber screen. There are excellent monitors now available with small switches which permit you to access a green, amber or colour screen. All three screens are clear, the text is easy to read and the graphics quality is excellent.

Printers

Printers come in all shapes and sizes. There is probably more compatibility among printers than any of the other peripherals associated with computers. When considering printers, the speed of print, the type of print, the number of print fonts (sizes and styles of characters), the paper feed mechanism and the interface (the manner in which the printer is connected to the computer) are all matters to be considered.

Printers usually use an impact or thermal method for transferring the characters to the paper. (Another option is a laser printer which is expensive but wonderful.) Probably the best thing to be said about thermal printers is that they are quiet. They use a special paper that is relatively expensive. Most printers used in the schools are impact printers, the most common of which is the dot matrix printer. Letter quality printers (Daisy wheel printers) are often used in business/administrative computing.

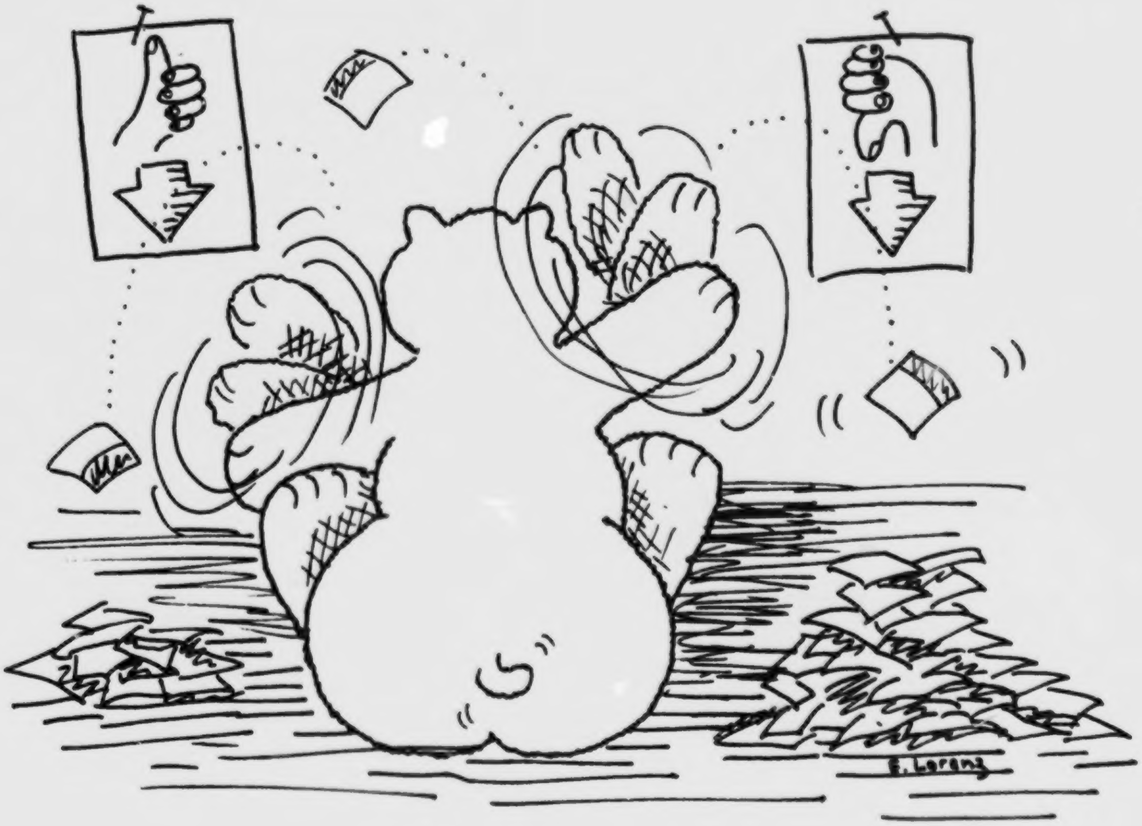
Dot Matrix printer can be incredibly versatile. Depending on the software and/or CPU that you are using your have access to a wide variety of fonts. I prefer the Imagewriter when using Apple CPU's. It is a good reliable printer. Additionally, although there is a lot of compatibility among printers, it is simpler to purchase a printer you know will be compatible with your CPU in every way. Teachers are too busy to waste time with unnecessary hardware difficulties.

Another way to enhance your children's productions is to purchase coloured ribbons and coloured continuous feed paper. These are a little more expensive but not unreasonable in price. In combination with **The Print Shop** or **The Newsroom**, some professional looking products can be produced by all students.

Software

Software refers to the programs that can be entered into RAM by the user. Usually programs are entered into the computer via 'input devices' like the disk drive or the keyboard although cassette tapes can also be used.

Software available and appropriate for use in the schools is increasingly available. However, don't let any software producer convince you to use their products unless you evaluate the product on YOUR terms. You know the curricula and you know your students. You are the only person QUALIFIED to choose software for your students' use. The best sources of recommendations for good sound educational software are other teachers. There are also some magazines offering comprehensive reviews. However, we teach according to the N.W.T. Curricula and only we can decide whether a software package is going to assist our students. I'll discuss this more in the Software Evaluation section of this manual.

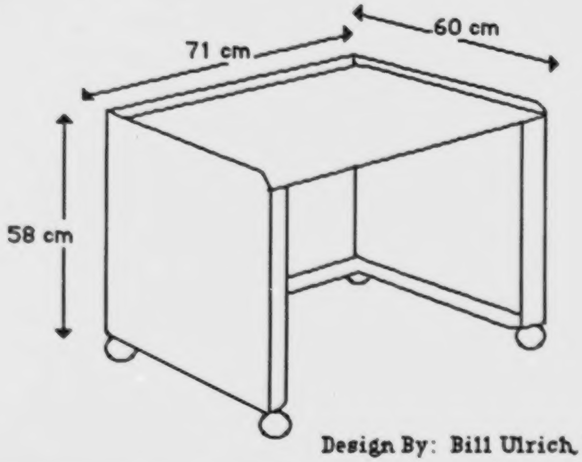


Preventative Medicine and Your Computer

The following suggestions could help you avoid breakdowns and unnecessary downtime.

1. Keep units covered when not in use. A crafts class or some willing parents may be happy to create some unique covers for the units.
2. If the computers are to circulate, keep them on moveable trolleys. This decreases the chances of dropping them. Perhaps the computer club would like to decorate them.
3. Treat the disks with a lot of respect and insist that anyone handling disks, no matter their age or senority, does the same.
4. Don't overwork your printer. Banners and other goodies from **The Print Shop** can give a printer 'heart failure'.
5. Keep food, drinks, and foreign objects away from your computer. Keep the keyboard as clean as possible.
6. Make sure wall units are not placed against a wall or desk back that may cause strain or crimping of connecting cables. These cables are often impossible to repair economically and need to be replaced if damaged.
7. Order some surge protectors to prevent damage due to power fluctuations. The unsteady flow which we all experience can play havoc with computers.
8. Don't locate your computer near an excessively warm area.
9. Be sure to discharge static electricity prior to beginning work with the computer. Consider ordering some static discharge mats for your computers.

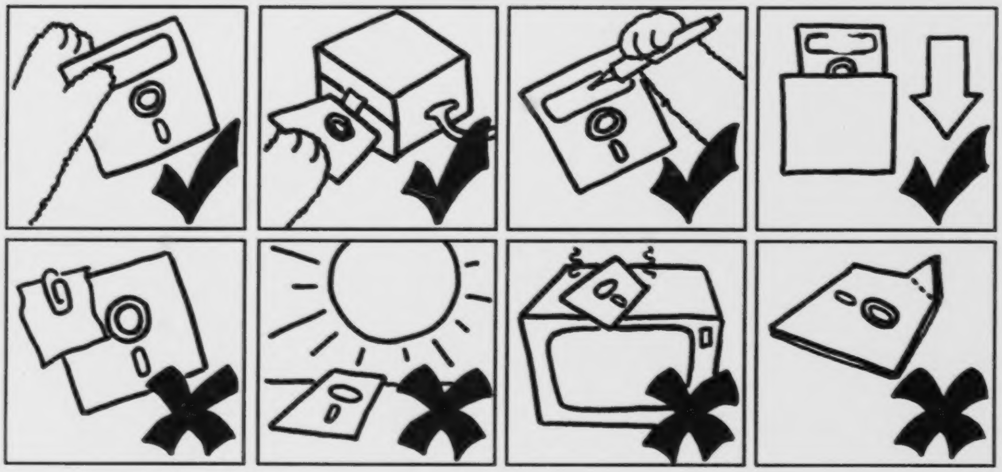
Movable Trolley For Elementary School Use



Design By: Bill Ulrich, M.H.E.S., Yellowknife.

How To Care For Your Floppy Disks

Floppy disks need lots of tender loving care. The information is standard and once learned becomes a matter of habit. Until it is habit, you might wish to post a sign (or signs) in a prominent place elaborating on the features of good disk care.



Disk Drives Need Good Care too!

1. Never, never turn on the computer without a disk in the disk drive. *
2. Never put in or pull out a disk when the red light is on!
3. Always leave the disk drive door open when it is not in use.

* There is some disagreement over this rule. Technically-minded people will state that because there a chance (albeit extremely minute) that the power will surge at just the precise moment you turn on your computer, you should always start with the disk drive empty. Most disagree.

Software Organization

As your school obtains more computers and begins to collect more and more software you will be swamped unless there is an organizational plan set in place. Depending on where and how your computers are being used you may locate all software in a central location, have a 'library' type checkout or distribute copies to classrooms on a semi-permanent basis.

The following considerations will assist your staff to set up an appropriate system:

*disks are easily accessible to teachers WHEN they need them
*software is stored in a central place in the school
*the procedure used to sign out disks is as uncomplicated as possible
*back up disks are stored in a locked cupboard and/or in a separate building
*a person is in charge of making back up copies, repairing disks, ordering recommended (approved by staff) software
*a catalog of disks available in the school is easily accessible
*student disks are located near computer(s)
*students are not allowed to use 'home" disks on school computers. (This has been found to be a major source of hardware problems in many districts.)
*software is evaluated upon arrival and introduced during staff meetings
*software recommendations are posted in a central location for staff members in order that ideas can be shared and the 'good news' can spread
*all new software has the warrenty filled out and returned to company
*software is ordered from companies that provide good service and permit return of unsatidfactory software
*a list is compiled of companies that provide good service and software is ordered through them when possible
*staff members have discussed the copying of disks and have agreed to an appropriate school position pending clarification of the Canadian legal situation in this regard
*rules regarding software care are understood and are adhered to by all individuals in the school

I would recommend that a software data base be set up as soon as possible and that all new software be recorded as it arrives. Up to date catalogs can be easily printed. A data base makes the software more accessible to all staff members. A data base also helps to meet the curricula objectives as both staff and students can see another example of how data bases are useful to all of us.

Troubleshooting

Many educators are not very experienced with electronic equipment. They become very nervous when a `mysterious ailment' strikes. Most assume it is something for which they are responsible. In most cases the individual has not `done' something terrible but rather does not know where to look to address the problem. The best suggestion to be made is to always assume that any problem is a simple problem that can be fixed. It's just a matter of figuring out what the problem is! The following suggestions are a result of solving mysterious ailments that have struck machines in my home and at school over the last two year and an excellent article in The Computing Teacher by P. Scott and R. Howell (February, 1984). While these suggestions are referenced to the Apple computer, most will apply to the Commodore as well. Be sure to check with your manual.

You turn on the power switch and nothing happens.

1. Is the power cord firmly plugged into a functioning outlet?
2. Is the power cord firmly plugged into the Apple?
3. If you are sure it is getting power, i.e., other devices get power from the outlet, it may be that the ON/OFF switch is faulty. Try flipping it several times and watch out for the "POWER" light. If it does flash, then you probably have a faulty toggle switch. Try to use PR#6 OR CONTROL/OPENAPPLE/RESET instead of the toggle switch.
4. If none of the above solve the problem start looking for a trained technician.

The monitor turns on, but you get no display.

1. Is the Apple itself turned on?
2. Is the interface cable properly plugged into both the monitor and the Apple. A connecting cord should be inserted into the metal connector marked "VIDEO" that is in the right rear corner of the Apple. The other end must be plugged into the back of the monitor.
3. Are the brightness and contrast knobs adjusted properly? Sometimes the horizontal and/or vertical knobs have been `adjusted' incorrectly.

Printer will not print.

1. Is it plugged in and turned on?
2. Is the interface card inside the Apple correctly installed? Be sure to turn off POWER when you're working inside the Apple. Check the cable that plugs into the interface card. Is it properly aligned on the pins?
3. Is the "on-line" switch turned on? This switch, located on the printer, can be used to stop printing without turning off the printer and must be disengaged on some printers in order to use the paper feed.
4. If there is a shutoff device when the printer runs out of paper, is it correctly engaged or disengaged?
5. Some printers have covers that must be closed before they will operate.
6. Some programs require that you `set them up' prior to printing. **The Print Shop** is one example. If the proper instructions have not been given then the printer will not interface properly with your Apple. Check your program manual if you think this might be the problem.

The POWER light is on, but the disk drive does not start up.

1. The disk may be bent or warped. Put in another one (preferably a disk you don't mind having destroyed) and try again. If the drive still does not work take the disks to another machine and try again. If the disks work in another machine you've isolated the problem to the drive.
2. The disk card may not be properly seated in slot #6. It is suggested that you turn the power OFF and remove the card. Take a clean eraser and gently rub the gold contact area at the base of the card. Reinsert gently and try again.
3. The interface cord may not be plugged into the disk controller card. EXTREME CARE MUST BE TAKEN HERE. Turn POWER OFF and remove the disk controller card. Attach cable carefully to the card. BE SURE THE PINS ALIGN or you will blow your analog card. This will result in a healthy repair bill. (I know!!)

The disk drive keeps spinning and APPLE II stays at the top of the screen.

1. Is the disk drive door closed?
2. Stop the computer, take out the disk, reinsert it and try again. If you can't get the disk out turn the drive over and remove the four screws. Pull the cover off and then remove the disk.
3. Try the disk on another machine, it may be damaged.
4. Your disk drive may be out of alignment and running either too fast or too slow. Programs are available to help you set the speed correctly. One such program is FAST COPY. Once you have a program that tells you the appropriate ranges you can adjust the speed by turning the tiny screw found inside the cover at the rear right of the disk drive. Turn the screw UP to increase speed and turn the screw DOWN to decrease speed.
5. If none of the above helps your disk drive may need to be sent (along with the disk controller card) for repairs. REMEMBER TO KEEP A SET OF BOXES AND PACKING MATERIALS FOR USE WHEN YOU NEED TO RETURN EQUIPMENT FOR SERVICING.

6. Troubleshooting
E.Lorenz

Computer Education Curriculum Objectives

Section 2

A Computer Education Curriculum

A curriculum is, according to the dictionary, a course of study. This curriculum, while being a course of study, is not yet complete for three major reasons. Firstly, while containing objectives and a suggested course of study, it does not have complete sets of activities and available resources to complement the objectives. Secondly, this curriculum, along with computers in education gernerally, does not pretend to be `grown up' but rather is entering its pre-adolescent stage. There are lots of growing pains, moodiness, and no doubt some downright contrariousness to contend with yet. And lastly, a good curricula has the individual stamp of the teachers, the schools and the communities in which it `grows up'. So, this curriculum is just a beginning. Teachers and students will have to take it further.

This curriculum is based on the philisophy that computers are tools to be used by students and adults to further their own goals. Schools are trying to prepare students for the future and while we can't tell them exactly what they need to know we can give them the tools they need to deal with whatever the future will bring. Tools such as Reading and Mathematical Literacy for the world we inhabit and Computer Literacy for the `Information Age' we are entering, are tools for the future. Through this curriculum we hope to give students some of the tools they will need to be free to choose in an Information Age.

This curriculum is also based on the understanding that children will be at different stages of computer awareness and knowledge. Teachers must start where their students skills start and proceed from there. In some cases all students in a school will begin at the beginning. In this curriculum the beginning is labeled K - 2. Be sure your students have a strong base of information and knowledge before you begin adding on the layers.

There are four sections or strands of this curriculum. One strand, entitled **Fundamentals**, covers basic computer literacy skills such as naming equipment, turning a computer on and running a program. The second strand is entitled **Procedures**. This section introduces students to thinking logically, controlling or programming the computer, and to two computer languages, LOGO and BASIC. The third strand is called **Impact**. In this strand teachers and students explore the use of computers in their home, their school and their community. The positive and negative impact of computers is discussed along with focusing on privacy and ethics as they relate to computer use. The fourth strand, and potentially the largest strand, is entitled **Applications**. This strand focuses on the use of the computer as a powerful tool. During this strand students will have the opportunity to use the computer to play, to learn, to challenge themselves, to publish, to communicate, to analyze, to explore, and to seek and organize information. In total this curriculum should assist teachers to organize experiences which will permit their students to make positive use of computers in a variety of ways

Computer Objectives K – 2

Fundamentals

- identify parts of a computer
- recognize that the computer needs instruction
- understand that computer instructions are contained in programs
- be able to explain the statement, "Computer mistakes are mistakes made by people."
- identify and use letters/numbers on a keyboard
- demonstrate proper care and use of hardware and software
- demonstrate how to insert disk, turn on computer and boot a program
- demonstrate how to run a program from a menu
- demonstrate ability to stop, escape from and
- continue a program as needed

Applications

- use educational games
- use and interact with drill and practice programs
- use and interact with simulation programs
- use the computer as a word processor

Procedures

- describe the procedures used to perform a task
- follow a procedure for a familiar task
- find and correct errors in a procedure
- show different procedures can produce same outcome
- modify a procedure to produce a different outcome
- use a Micro-world such as Instant Logo or E.Z. Logo

Impact

- understand rules for using equipment and programs
- discover computer applications in home and community

Computer Objectives

3 - 4

Fundamentals

- define and spell basic computer terms
- recognize simple error messages
- use documentation that describes programs and how to use them
- identify and use common special purpose keys
- develop correct keyboarding skills
- evaluate software according to a specific criteria

Procedures/Programming

Using Logo

- write simple procedures in Logo using basic Logo commands
- break a problem into smaller chunks or subproblems; plan procedures and subprocedures
- develop a working (debugged) procedure involving repetition
- find and correct errors in procedures
- use editing commands to correct procedures
- explain simple error messages
- use procedures to perform new tasks
- apply procedure skills to new problems

Applications

- use educational games
- use and interact with:
  - drill and practice programs
  - tutorial programs
  - problem-solving programs and
  - simulation programs
- use the computer as a word processor
- be able to explain some of the differences between the different kinds of programs

Impact

- understand and explain the reasons for rules regarding equipment and programs
- be able to identify the use of computers in the community

Computer Objectives 5-6

Fundamentals

- use documentation that describes programs and tells how to use them
- evaluate software according to specific criteria
- explain how a computer works (output/input)
- recognize tasks which require computer speed
- recognize simple error messages
- identify common tasks which are not suited for computers
- continue to learn and use correct keyboarding skills

Applications

- use educational games
- evaluate an assortment of software
- use and interact with drill and practice programs
- use and interact with a simulation program
- use and interact with problem-solving programs
- use and interact independently with a Word Processing program
- use and interact with a data base program

Procedures/Programming

USING LOGO

- write a procedure using variables
- write a procedure(s) with single and multiple inputs
- write a simple text program
- demonstrate the application of problem-solving strategies by writing a procedure(s) to solve an assigned problem
- note the differences between procedures for people and procedures for computers
- explain the concept of programming in terms of procedures and Logo

USING BASIC...

- introduce PRINT, HOME, NEW, RUN
- introduce use of line numbers
- write a simple program in BASIC

USING FLOWCHARTS...

- break problem into subproblems; plan procedure(s) and subprocedures
- write a simple flowchart to represent a solution to a task
- describe standard flowchart symbols and read a flowchart

Impact

- understand reasons for restricting access to data bases and programs
- understand advantages and disadvantages of particular uses of information retrieval
- understand copyright and computer software piracy

Computer Objectives 7 - 9

Fundamentals

- use documentaion that describes programs and explains use
- evaluate software according to specific criteria
- perform procedures using DOS commands to:
  1. Copy a simple program
  2. Save a simple program
  3. Delete all or partof a program
- apply knowledge of fundamentals to new situations
- recognize capabilities of different types of computers
- be aware of and be able to use different operating systems
- continue to acquire correct keyboarding skills

Procedures/Programming

Using Logo

- list basic commands
- design a graphics and text program

Using Flowcharts

- translate a simple flowchart into a computer program using Logo and BASIC
- recognize and accept different variations or solutions to problems

Using BASIC

- list fundamental statements and commands
- identify and use nested loops
- use numeric and string variables
- write a simple program to accomplish a specific task using INPUT, LET, FOR-NEXT, and READ/DATA statements
- write graphics program with text
- test and debug programs
- write simple documentation for programs
- distinguish random computer commands from program statements

Applications

- use and interact with:
  - simulation programs
  - problem-solving programs
- use a word processing program independently
- use a database program
  - set up database
  - use information to publish a report
- use an electronic spreadsheet
  - participate in building a spreadsheet file
  - use the spreadsheet to make predictions/estimates
  - write a report on the findings

Impact

- understand the implications of copyright laws
- identify advantages and dangers of computer databases
- describe some of the effects of computer failure
- describe the legal issues resulting from widespread computer use
- become aware of computer professions and list values of computer skills for employment in a variety of careers
- list several ways computers are used to help consumers
- list characteristics of each generation of computers
- appreciate the impact of computers on physically disabled people
- be introduced to the study of robotics and artificial intelligence

Where To Begin Instruction

Begin at the beginning! It's easy to say isn't it? Sometimes it is difficult to do! If your students are fairly new to computers start with the K - 2 objectives and go as far as you can. Introduce them to the **Fundamentals** initially and give them lots of time to experience a wide range of software. This is the time to get the parents involved either as aides or as 'students' for your students to teach. Spend your instruction time developing good 'computer habits'. Let your students get used to the scheduling of computer access. Keep timetables as routine and regular as possible.

As you introduce initial concepts, gauge your class's expertise and interest, sort out computer access with other staff members if you haven't already, and start to map out your long range plans for the year. Refer to "Creating Computer Users In Your Student Population" for assistance in this regard.

Try to teach some basic keyboarding skills to all your students. Keyboarding will pay off when you start to introduce word processing. Build a routine where you teach a lesson or introduce a piece of software each week. Schedule at least thirty minutes into your timetable for Computer Education. Schedule a longer period if you're teaching Grade Six and up. Tell everyone about your weekly computer focus so peer pressure or threats of student revolt will force you to keep at it.

Let the students have some independent time each week on the computer. If you feel the need to justify the time you might be taking away from other subject areas have a look at the skills the students can be developing. These skills will pay dividends in every subject area. They are: learning to work independently, to cooperate with others, to care for delicate equipment, to follow instructions carefully, to generalize from one situation to another, learning to watch for cause and effect, sharing experiences and expertise with peers, building self-esteem and becoming 'computer literate'. All this before you begin to look at the objectives being met while using the software component of your computer education program. As the students progress, the application programs start to pay real dividends in terms of the core curriculum.

The following pages are designed as open-ended checklists to assist you to keep track of where you and your students are along the continuum. Use them in any way you wish. You might find the checklists particularly handy when writing records and reports.

FUNDAMENTALS

K - 2

☐ ☐ ☐ ☐ ☐ ☐ ☐ *identify parts of a computer
☐ ☐ ☐ ☐ ☐ ☐ ☐ *recognize that the computer needs instruction
☐ ☐ ☐ ☐ ☐ ☐ ☐ *understand that computer instructions are contained in programs
☐ ☐ ☐ ☐ ☐ ☐ ☐ *be able to explain the statement, "Computer mistakes are mistakes made by people."
☐ ☐ ☐ ☐ ☐ ☐ ☐ *identify and use letters and numbers on a keyboard
☐ ☐ ☐ ☐ ☐ ☐ ☐ *demonstrate proper care and use of software and hardware
☐ ☐ ☐ ☐ ☐ ☐ ☐ *demonstrate how to insert disk, turn on computer, and boot a program
☐ ☐ ☐ ☐ ☐ ☐ ☐ *demonstrate how to run a program from a menu
☐ ☐ ☐ ☐ ☐ ☐ ☐ *demonstrate ability to stop, escape from and continue a program as needed

Grades 3 - 4

☐ ☐ ☐ ☐ ☐ ☐ ☐ *define and spell basic computer terms
☐ ☐ ☐ ☐ ☐ ☐ ☐ *recognize simple error messages
☐ ☐ ☐ ☐ ☐ ☐ ☐ *use documentation that describes programs and tells how to use them
☐ ☐ ☐ ☐ ☐ ☐ ☐ *identify and use common special purpose keys
☐ ☐ ☐ ☐ ☐ ☐ ☐ *develop correct keyboard skills
☐ ☐ ☐ ☐ ☐ ☐ ☐ *evaluate software according to specific criteria

Grades 5 - 6

☐ ☐ ☐ ☐ ☐ ☐ ☐ *use documentation that describes programs and tells how to use them
☐ ☐ ☐ ☐ ☐ ☐ ☐ *evaluate software according to specific criteria
☐ ☐ ☐ ☐ ☐ ☐ ☐ *explain how a computer works (output/input)
☐ ☐ ☐ ☐ ☐ ☐ ☐ *recognize tasks which require computer speed
☐ ☐ ☐ ☐ ☐ ☐ ☐ *recognize simple error messages
☐ ☐ ☐ ☐ ☐ ☐ ☐ *identify common tasks which are not suited for computers
☐ ☐ ☐ ☐ ☐ ☐ ☐ *continue to learn and use correct keyboarding skills

Grades 7-9

☐ ☐ ☐ ☐ ☐ ☐ ☐ *use documentation that describes programs and explains use
☐ ☐ ☐ ☐ ☐ ☐ ☐ *evaluate software according to specific criteria
☐ ☐ ☐ ☐ ☐ ☐ ☐ *perform procedures using DOS commands to:
    1. Copy a simple program
    2. Save a simple program
    3. Delete all or part of a program
☐ ☐ ☐ ☐ ☐ ☐ ☐ *apply knowledge of fundamentals to new situations
☐ ☐ ☐ ☐ ☐ ☐ ☐ *recognize capabilities of different types of computers
☐ ☐ ☐ ☐ ☐ ☐ ☐ *be aware of and be able to use different operating systems
☐ ☐ ☐ ☐ ☐ ☐ ☐ *continue to acquire correct keyboarding skills

Impact

K - 2

☐ ☐ ☐ ☐ ☐ ☐ ☐ *understand rules for using equipment and programs
☐ ☐ ☐ ☐ ☐ ☐ ☐ *discover computer applications in home and neighbourhoods

Grade 3 - 4

☐ ☐ ☐ ☐ ☐ ☐ ☐ *understand and explain reasons for rules regarding equipment and programs
☐ ☐ ☐ ☐ ☐ ☐ ☐ *be able to identify use of computers in the community

Grade 5 - 6

☐ ☐ ☐ ☐ ☐ ☐ ☐ *understand reasons for restricting access to databases and programs
☐ ☐ ☐ ☐ ☐ ☐ ☐ *understand advantages and disadvantages of particular uses of information retrieval
☐ ☐ ☐ ☐ ☐ ☐ ☐ *understand copyright and computer software piracy

Grades 7 - 9

☐ ☐ ☐ ☐ ☐ ☐ ☐ *understand the implications of copyright laws
☐ ☐ ☐ ☐ ☐ ☐ ☐ *identify advantages and dangers of computer databases
☐ ☐ ☐ ☐ ☐ ☐ ☐ *describe some of the effects of computer failure
☐ ☐ ☐ ☐ ☐ ☐ ☐ *describe the legal issues resulting from widespread computer use
☐ ☐ ☐ ☐ ☐ ☐ ☐ *become aware of computer professions and list values of computer skills for employment in a variety of diverse careers
☐ ☐ ☐ ☐ ☐ ☐ ☐ *list several ways computers are used to help consumers
☐ ☐ ☐ ☐ ☐ ☐ ☐ *list the characteristics of each generation of computers
☐ ☐ ☐ ☐ ☐ ☐ ☐ *appreciate the impact of computers on physically disabled people
☐ ☐ ☐ ☐ ☐ ☐ ☐ *be introduced to the study of robotics and artificial intelligence

Procedures/Programming

K - 2

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ * describe procedures used to perform a task
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ * follow a procedure for a familiar task
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *show different procedures can produce the same outcome
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *find and correct errors in a procedure
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ * modify a procedure to produce a different outcome
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *use a Micro-world such as Instant Logo or E.Z. Logo

Grades 3 - 4

Using Logo
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ * write simple procedures in Logo using basic Logo commands
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *break a problem into smaller chunks or subproblems; plan procedures and subprocedures
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *develop a working (debugged) procedure involving repetition
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *find and correct errors in procedures
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *use editing commands to correct procedures
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *explain simple error messages
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *use procedures to perform new tasks
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *apply procedure skills to new problems

Grades 5 - 6

Using Logo
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *write a Logo procedure using variables
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ * write a Logo procedure(s) with multiple inputs
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *write a simple text program
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ * demonstrate the application of problem-solving strategies by writing a procedure(s) to solve an assigned problem
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ * note the differences between procedures for people and procedures for computers
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *explain the concept of programming in terms of procedures and LOGO

Using Flowcharts
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *break a problem into subproblems; plan procedure(s) and subprocedure(s)
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *write a simple flowchart to represent a solution to a task
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *describe standard flowchart symbols
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *read a flowchart

Grade Six Only
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *introduce the BASIC lanuguage
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *introduce line numbers
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *introduce commands PRINT, HOME, RUN, NEW, END
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *write a simple BASIC program

Procedures/Programming (con't)

Grade 7 - 9

Using Logo
☐ ☐ ☐ ☐ ☐ ☐ ☐ *list basic commands
☐ ☐ ☐ ☐ ☐ ☐ ☐ *design a graphics and text program
Using Flowcharts
☐ ☐ ☐ ☐ ☐ ☐ ☐ *translate a simple flowchart into a computer program using Logo and BASIC
☐ ☐ ☐ ☐ ☐ ☐ ☐ *recognize and accept different variations or solutions to problems
Using BASIC
☐ ☐ ☐ ☐ ☐ ☐ ☐ *list fundamental statements and commands
☐ ☐ ☐ ☐ ☐ ☐ ☐ *identify and use nested loops
☐ ☐ ☐ ☐ ☐ ☐ ☐ *use numeric and string variables
☐ ☐ ☐ ☐ ☐ ☐ ☐ *write a simple program to accomplish a specific task using INPUT, LET, FOR-NEXT, and READ/DATA statements
☐ ☐ ☐ ☐ ☐ ☐ ☐ *write graphics program featuring text and graphics
☐ ☐ ☐ ☐ ☐ ☐ ☐ *test and debug programs
☐ ☐ ☐ ☐ ☐ ☐ ☐ *write simple documentation for programs
☐ ☐ ☐ ☐ ☐ ☐ ☐ *distinguish random computer commands from a computer program
☐ ☐ ☐ ☐ ☐ ☐ ☐ *distinguish system commands from program statements

APPLICATIONS

K - 2

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *use educational games
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *use and interact with a drill and practice program
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *use and interact with a simulation program
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *use the computer as a word processor

Grades 3 - 4

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *use educational computer games
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *use and interact with drill and practice programs
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *use and interact with tutorial programs
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *use and interact with problem-solving programs
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *use and interact with simulation programs
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *use the computer as a word processing program
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *be able to explain some of the differences between the different types of programs

Grades 5-6

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *use educational games
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *evaluate an assortment of software
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *use and interact with drill and practice programs
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *use and interact with problem-solving programs
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *use and interact with simulation programs
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *use a word processing program
    -operate it independently
    -retrieve and save documents
    -print documents without assistance
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ *use and interact with classroom data bases
    -understand they are collections of information
    -be able to answer questions, sort information, and prepare reports
    -participate in the preparation of a data base

Applications (Con't)

Grades 7 - 9

☐ ☐ ☐ ☐ ☐ ☐ ☐ *use and interact with simulation programs
☐ ☐ ☐ ☐ ☐ ☐ ☐ *use and interact with problem-solving programs
☐ ☐ ☐ ☐ ☐ ☐ ☐ *use word processing programs
  -be able to operate a word processing program independently to 'publish' personal products/assignments
☐ ☐ ☐ ☐ ☐ ☐ ☐ *use a data base program
  -set up a mini-database and use the information to prepare a report
☐ ☐ ☐ ☐ ☐ ☐ ☐ *use an electronic spreadsheet
  -participate in building a spreadsheet file
  -use the spreadsheet program to make predictions/estimates
  -write a report based on the findings

Creating Student Computer Users

Section 3

Creating Computer Users In Your Student Population

The key to the delivery of any curriculum is well-thought out and well executed Long Range Plans. The following is a blueprint for your long range plans. Sections referred to thoughout contain more detailed information, sample lessons and/or units and recommendations of additional resources. They can be found in the section entitled, "Computer Education In Practice: The Nitty Gritty Stuff". This long range plan should help you formulate your own plans which meet your students needs and reflect the number of computers and software available to you.

Long Range Plans

Part One

- ☐introduce fundamentals
    - include all objectives from K - 4 if possible
    - allow students to use a variety of software (drill & practice/educational games)
- ☐include parents/community members as much as possible
- ☐award "Computer User's Certificates" to students as they qualify or to all students when they all qualify if it's to be a joint class effort!
- ☐introduce Impact strand (try to introduce concepts from K - 4)
- ☐introduce the concept of evaluation of software
- ☐students should evaluate all software used during this period either individually or as a team or group effort. Keep all software evaluations on display or on file.

Part Two

- ☐introduce formal keyboarding practice for students in Grade three and up (see Keyboarding section for details)

Part Three

- ☐introduce students to word processing
    - K - 2 -students can dictate stories to parent or teacher aides
    - 3 - 6 -students can learn to use a child's word processing program and publish personal works or work with teacher prepared files
    - 7 - 9 -students can learn to use more than one word processing program or begin to use an integrated program such as Appleworks
- ☐continue to practice keyboarding skills

Part Four

- ☐use and interact with a simulation program as part of a Science/Mathematics/Social Studies Unit
    - K - 2 -students use program in groups under the guidance of an adult/ older student who possesses good reading skills
    - 3 - 4 -students use simulation programs in pairs and report progress to larger group
    - 5 - 9 -students use simulation programs and report as to how this type of program is different from other programs

Part Five

- ☐introduce procedures and Logo (K and up)
- ☐introduce flowcharting (K and up)
- ☐introduce BASIC (Grades 6 and up)
  (See appropriate section for details)

Part Six

- ☐use and interact with a problem solving program other than Logo
  (Grade 2 and up)

Part Seven

- ☐introduce data bases
  (see data base section for details)
- ☐introduce relevant topics from Impact strand
- ☐introduce topics not previously covered in Fundamentals strand
  (up to appropriate level)

Part Eight

- ☐introduce electronic spreadsheets
  (see Spreadsheet section for details)

Part Nine

- ☐explore issues, trends, and concerns raised in Impact section
  (Consider contacting your Resource Center and asking
  for relevant films/videos)

Part Ten

- ☐identify uses of computers in your community
- ☐arrange for a more intimate introduction to computers being used
  in your community
- ☐identify uses of computers in the N.W.T. and Canada

It is important that you do those sections which you feel you can do well. You'll be able to do more during your second and subsequent years teaching Computer Education.

PARENT and COMMUNITY PARTICIPATION

Parental involvement and support can guarantee the success (or failure) of any school program. Many people (including parents) love or hate computers while others are simply afraid of them. It is important that teachers organize a school-wide effort to get parents involved and supportive of the school program.

There are many ways to reach out and achieve parental involvement and support. You will know which ones are appropriate for you, your school and your community. Some ideas are:

1. Invite the parents to come to an Open House. Let the children demonstrate some of their favorite (and of course educationally sound) programs. Parents will appreciate the student's enjoyment and demonstrated mastery over the computer.

2. Invite the parents to come to the classroom to receive a computer lesson from their child. If it'll help, have the children provide an escort for their parents into the classroom. They can introduce their parent(s) to the class and/or teacher and then take them away to a corner of the classroom for a private lesson.

3. Send notes home outlining the school's aspirations for the computers during the upcoming school year.

4. Offer mini-evening sessions on how to use some of the different programs.

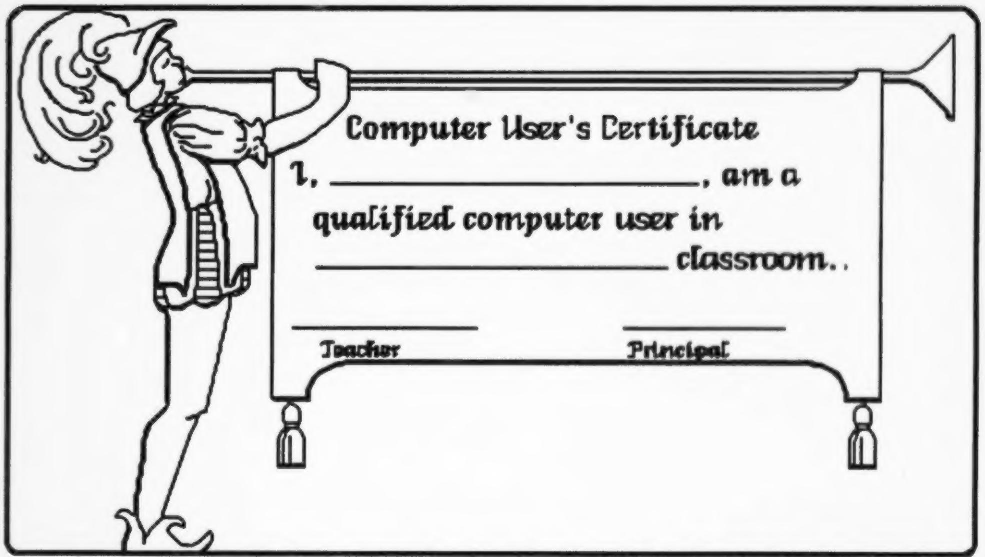
5. Send home a monthy newsletter prepared by the students on the computer. Include information on students' computing achievements, news on equipment the school plans to recieve and any fund raising the school hopes to do to raise money for equipment.

6. Turn knowledgeable parents into school volunteers. Ask parents with existing expertise or train parents to work with students on the computer. Often an adult assistant can turn a mediocre program into an excellent program just by being there to talk with the children about what they are doing.

7. Set up a weekend lending library of software and/or hardware. I have been continually impressed with how carefully students (and others) handle computer equipment. If you're worried about losing the use of your machines, designate one for weekend and holiday use, or organize a fund raiser to purchase a machine for family use. Be sure that people without machines at home are encouraged to borrow it before those with machines are allowed access.

Computer User's Certificates

These certificates are for your use. An empty certificate has been included to encourage you or your students to develop a certificate unique to your school and community.

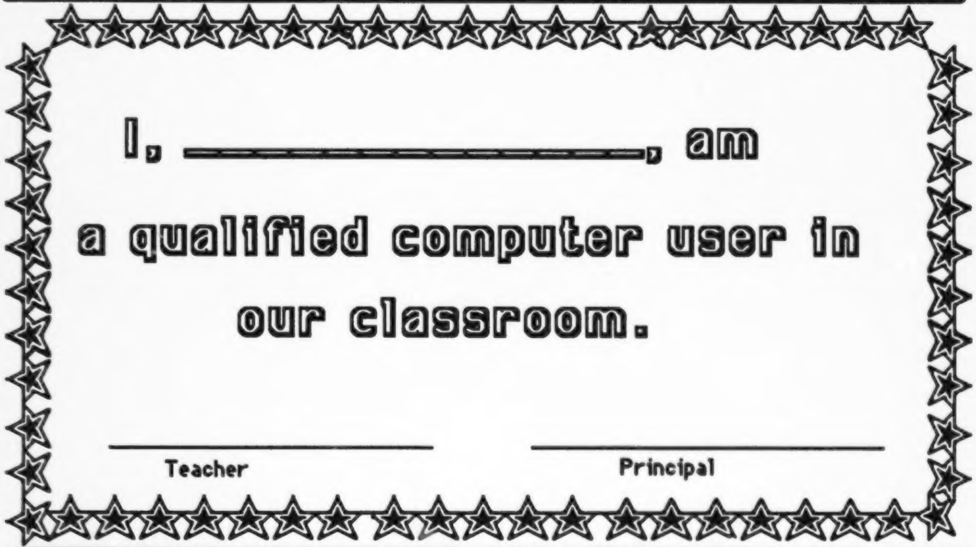


Computer User's Certificate

I, ____________________, am a qualified computer user in ____________________ classroom..

Teacher

Principal



I, ____________________, am a qualified computer user in our classroom.

Teacher

Principal

Computer User's Certificates (back)

Use these checklists back to back with your certificates. They will assist both you and your students to know what has been accomplished. They also provide good feedback to parents.

This certificate was granted after the student demonstrated that she/he knows:

- ☐ how to turn the computer on and off
- ☐ how to 'warm boot' the computer
- ☐ how to insert and handle disks properly
- ☐ how to return software properly
- ☐ the location of the most frequently used keys
- ☐ who to ask for help should help be required
- ☐ how to handle the hardware carefully
- ☐ how to 'ground' her/himself before using equipment.

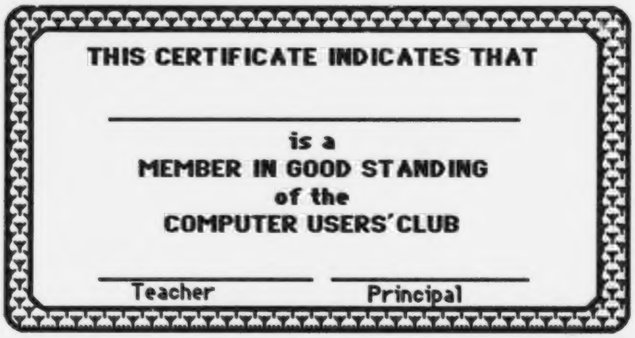
____________________ ______________
Teacher Date

This certificate was granted after it was determined that ____________________ knows:

- ☐ how to turn the computer on and off
- ☐ how to 'warm boot' the computer
- ☐ how to insert and handle disks properly
- ☐ how to return software properly
- ☐ the location of the most frequently used keys
- ☐ who to ask for help should help be required
- ☐ how to handle the hardware carefully
- ☐ how to 'ground' her/himself before using equipment.

____________________ ______________
Teacher Date

The following certificates can be awarded to students who meet the basic 'Computer Users' criteria. If a laminating machine is available, they could be plasticized.

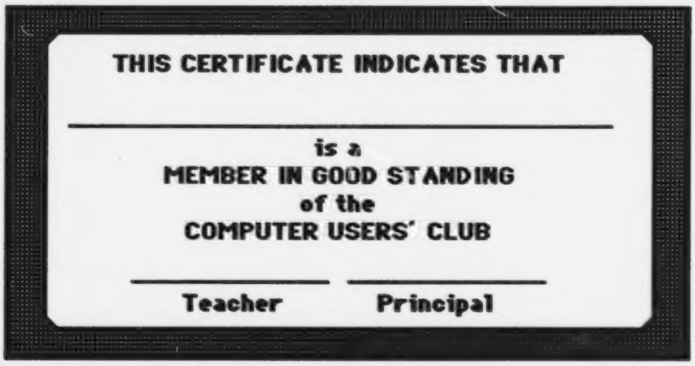


THIS CERTIFICATE INDICATES THAT

is a
MEMBER IN GOOD STANDING
of the
COMPUTER USERS'CLUB

Teacher Principal

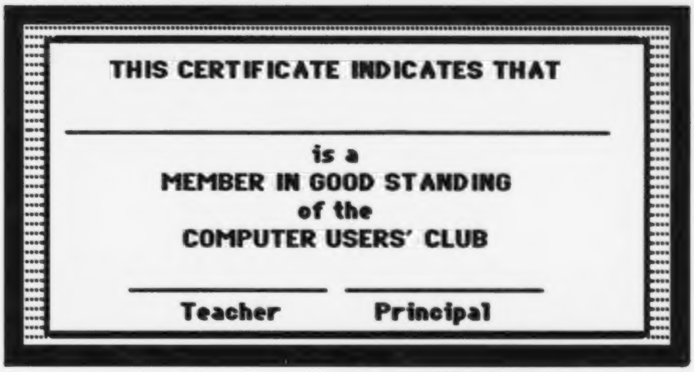
Mini-Certificates
For Computer Users



THIS CERTIFICATE INDICATES THAT

is a
MEMBER IN GOOD STANDING
of the
COMPUTER USERS' CLUB

Teacher Principal



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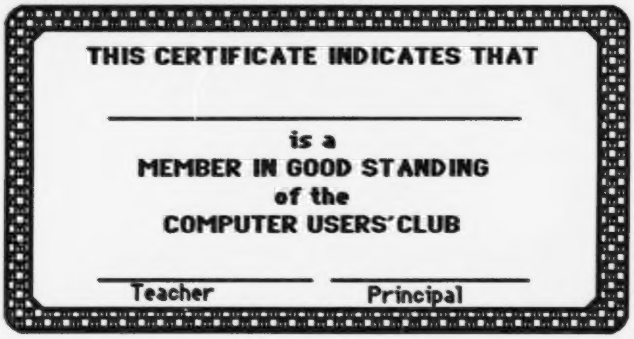
Teacher Principal



THIS CERTIFICATE INDICATES THAT

is a
MEMBER IN GOOD STANDING
of the
COMPUTER USERS'CLUB

Teacher Principal

COMPUTER USE:

IN THE SCHOOL AND IN THE CLASSROOM

Section 4

Computer Organization

The role computers will have in your school depends to a large extent on where they are located. There are basically two directions in which to proceed; either the students go to the computers or the computers go to the students. There are many factors to consider before you choose one option or another or a combination of both approaches.

Try asking the following questions:

Should all children to have equal access to computers?
Are all children capable of using computers?
Should classroom teachers have responsibility for all student classroom learning?
Should all teachers use computers in their classrooms?
Should learning ABOUT computers be more important than learning WITH computers?
Should computers be used to assist and reinforce learning in many subject areas?
Are all teachers capable of using computers with their students?
Is it important for computers to be in use ALL THE TIME?
Should Computer Education be a specialist subject in the elementary school?
Should computer use be flexible and the machines organized according to need?
Is there someone who can act as a resource person and support the relatively inexperienced computer using teacher? Is there help in terms of classroom organization and inservice?
Is the entire staff willing to try and implement some sort of program or is there just a few individuals right now?
Is the ability to use computers effectively going to become a requirement for all teachers?

Depending on your answers to the above questions you are probably able to make an initial decision regarding computer use. If you believe that teachers should have owership or responsibility for student learning, if you believe that students should be taught how to use computers and then USE THEM as assists in all subject areas, if you believe that all teachers need to use them in some way and all students are capable and should have access and if you've got an individual or two who is willing to assist classroom teachers.... then, you should look at classroom teachers delivering a short 'computer literacy' component and then moving to using computers in Math, computers in Language Arts and computers in Science, Social Studies and every other subject area. Computers, under these conditions should be in the classrooms with the students and with the teachers.

If you feel that 'Computer Literacy' is a specialized subject and learning ABOUT computers is more important than learning with them right now, that many classroom teachers aren't interested and perhaps not yet capable of teaching with computers, if you believe that classroom

The Computer Setup

Once you've sorted out where the computers are going to be or when they are going to be in your classroom, it's time to check and make sure everything is ready. The list below should help you doublecheck the setup.

○ If computer is mobile, it is placed on a steady cart with casters. Excessive rough movement can cause equipment failure or worse yet, injury!

○ All software is catalogued and stored in one spot. Teachers either know how to sign out equipment or have been issued classroom copies of software. (We've begun issuing classroom sets of useful Public domain or MECC software. Commercial software disks or kits are checked out on a library type system. Make sure that your BACKUP never leaves a lockable office.)

○ A neatly typed software listing tells students how to locate each piece of software in the classroom or lab collection.

○ A file box of task cards provides students with activities to try or an assignment sheet is posted.

○ Computer bulletin boards are colourful and welcoming. Operating instructions (both pictorial and printed) are helpful and posted in a prominant place.

○ The physical 'home' for the computer is appropriate:
  -computer monitors are placed away from direct sunlight to avoid eye discomfort caused by glare
  -computer will be placed in a carpet-free zone or the carpet has been sprayed with a solution of one part fabric softener to three parts water to help reduce static shocks
  -there are enough electrical outlets to accomodate each computer and peripheral (consider using a power bar or a system saver to reduce the number of outlets needed)
  -if lamplight is provided, light is directed toward paperwork and the keyboard and away from the video display terminal
  -a rack holds computer resources... manuals, HELP guides, magazines

As we become more comfortable with computers in our lives it's easy to begin to take them for granted. Be careful that your relaxed attitude does not lead to abuse. Don't start to pile books on it, leave disks lying around or let garbage collect around the computers.

teachers do not need to be responsible for their students learning, if your think that computers should be in use ALL THE TIME, if there is no one on staff able to or willing to assist teachers and provide support for their classroom computer endeavors, if you believe that certain groups of students should get preferred access, if there is space available in your school which could serve as a potential laboratory... then, you should look at putting together a computer laboratory and if possible arranging timetables in order that one individual could deliver a computer education program or alternatively provide times for all teachers to bring their classes into the laboratory for sessions.

If your school has very few computers then the laboratory versus computers in the classroom will likely not be an issue...yet. The use of a laboratory setting in most instances seems to lead to the perception that Computer Education is a specialist subject and not easily integrated into classroom activites. In fact, this perception is misleading since computers are quickly becoming a part of every home and business.

Also, teachers with little experience using computers tend to not use the lab. facility. Therefore, unless a specialist position is created, not all children get equal access to the computers. With computers in the classrooms, all teachers are `coerced 'into using them and there is more equitable use by students. Given some support, all classroom teachers can teach an adequate `Computer Education' program and then get on to the important business of using them. When more than one computer is needed for a special project, classroom teachers can arrange to borrow computers from other rooms to group together for a period of time. Flexibility is the outstanding virture of successful computer use in elementary schools.

For older students, who need to spend more time learning ABOUT computers, a lab setting is efficient and to be recommended where there are sufficient numbers of computers.

Timetabling Computer Use In The School

There are a variety of ways to schedule the use of computers in your school. The way selected will depend primarily on the number of computers, number of students and the priorities the staff have laid down for computer use. The following chart looks initially at the one computer per classroom situation and then 3 or more computers per school. It is hoped that this chart will give your staff an overview of some of the options. It is up to you to come up with the best solution to fit your needs. Sometimes your needs will change during the school year depending of the type of work for which the computers are being used. That's fine. Changes don't indicate mistakes, they indicate flexibility and responsiveness to changing needs.

Computers/Students

1/300

☐Don't expect to deliver a complete program.
- •have computer spend a week or two in each classroom
- •try to issue Computer User's Certificates to all students
- •concentrate on 'off-computer' activities... see Logo In the Classroom, Impact Activities, Computer Tutor text and call Resource Center for films/videos for older students

1/100

☐Computer makes it's home in each classroom for approximately a month twice a year
- •computer 'hands-on' objectives covered/computer is always busy
- •during times without computers students and teacher focus on Impact strand/general computer knowledge/keyboarding with paper templates/animate computer tasks such as person-Logo and data bases on cards with students playing the part of the computer

☐Locate machine in single location, assign an individual responsiblity for taking groups of children throughout the year for computer computer activities.

1/50

☐Share computer between classrooms on a regular schedule... either afternoons/mornings or Mondays/Wednesdays and Tuesday/Thursdays with Fridays being shared special activity time.

☐Divide the school year in two and let one class do as much as possible during the first 5 months and the second class concentrate on computer activities the second 5 month period.

1/25

☐One computer per class each day or 2 per class per half day. Focus of use becomes, increasingly, using the computer as a tool rather than an object of study.

☐Computers gathered together in a lab situation. One individual assigned the task of organizing computer time and assisting teachers to use the computers with their students on a regular basis.

☐Computers placed in a lab and one individual is assigned the responsibility of teaching all students the computer program.

Timetabling Computer Use In The School
(continued)

Computers/Students

1/8

☐Computers grouped in classrooms
  - •Teachers organize daily instructional periods so each working group has opportunity to work with computers using programs appropriate to topic of study
  - •Every subject area has a 'computer' stream when computers are used to develop problem solving strategies, thinking skills, extend the topic of study or provide reinforcement of skills.

3/250

☐Collect 3 or more computers together and rotate them in a group from class to class. Teachers can organize the operation of three instructional groups. One of these groups would be able to use the computers to extend the study of the subject or topic.

☐Keep the computers in a lab setting and assign an individual to organize and instruct a computer program.

☐The three computers are available to be booked into classrooms for an extended period of 'Computer Education'.

10/350

☐Computer access time is divided among classrooms and teachers have regular times set aside for individual student time and for group instruction time.

☐The computers are gathered together in a lab setting and all teachers have equitable access time

☐The computers are gathered together for periods in the year for hands-on teaching periods and are distributed the rest of the time for individual student use under the direction of the classroom teacher.

Computer Rules

We, the students of ________________________ understand and have agreed to follow the following rules when we use the computer equipment.

1. **Do not eat or drink near computer equipment since spilled food and drink can damage software and machines.**

2. **Try to work out problems you have with software on your own. If you can't, read the written directions that come with the software or ask another student to help you. If you still can't work out the problem, ask a teacher for help.**

3. **Do not remove a disk when the red light on the disk drive is on. Moving the disk can scramble or erase data on the disk.**

4. **Do not bend, tear, or fold a disk. Read the information about disks so you will know how to use them properly.**

5. **Be patient. Do not stand over classmates to hurry them along. If it's your turn tell the current user you are waiting and take a seat somewhere while s/he exits the program.**

6. **When your computer time is up, clear the screen and your program from memory. This let's the next user know you are done.**

7. **Always file your software away properly when you are finished.**

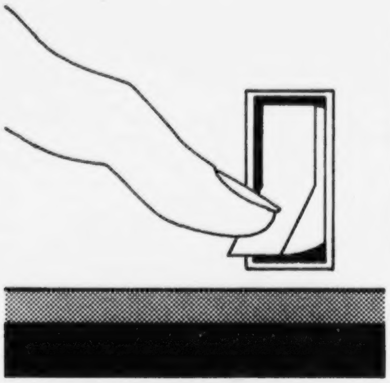
8. **Before leaving the computer, tidy up the area in which you worked and take all your personal belongings with you.**

COMPUTER TIMETABLE

SIGN-UP SHEET FOR THE WEEK OF ______________________________

TIME	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY

The Computing Teacher April 1985 11
Vol. 12 No7



Don't Turn Off That Computer!

by
Doris M. Kneppel

Have you ever walked down the hall of your school and noticed the computers sitting idle? Is there a way to keep those computers busy most of the day without the teacher's supervision? Take a peek inside this classroom and see for yourself.

John is at the computer looking perplexed. He glances over at Miss Johnson, who is working with a math group. John looks around the room and walks purposefully over to Janet who gets up and joins him at the computer.

John shows Janet what he's working on and a quiet discussion of the problem is underway. John's face clears and he is once more deeply involved in his work, never noticing that Janet has gone back to her desk.

All too soon the timer signals his turn is over. John saves his work on a disk, gathers his notes and looks for Kelly, whose turn is next. Kelly is with her math group so John writes her name on the board and signals Leslie that it's her turn. Leslie sets the timer and is quickly absorbed in the Logo program she began yesterday.

Suddenly she realizes her math group is being called. Leslie writes her name under Kelly's, and writes a "7" next to it. As the first math group leaves, Kelly, seeing her name on the board, erases it and heads for the computer.

What is being described here is a method of managing the rotation of children at the computer with a minimum of disturbance. It encourages peer help and appeals to the sense of fairness which many children have honed to a keen edge. Keeping the computer working this way assures each child of approximately 35 minutes of computer time a week.

In schools where the computer is rotated from room to room, its presence often threatens to disrupt lessons and is a distraction to children as they anxiously await a turn. There is frustration over missed turns and arguments about who has had more than their share of time. The situation can become so frustrating for a teacher trying to keep up with a tight teaching schedule that it sometimes seems that the only way to manage the situation is to turn the darn thing off!

> ***"This method of managing computer time ... encourages peer help and appeals to the sense of fairness which many children have honed to a keen edge."***

There is a way, though, to manage computer time so it is always in use except when whole-class instruction is being given. For those schools where there is a computer in every room or those schools where the computer is wheeled in only occasionally, a system such as this will work.

It begins with a prominently displayed poster listing alphabetically the names of the children in the class. For minimum distraction, the computer is set up in a far corner of the room with its back to the class. Next to the computer is a kitchen timer. With appropriate solemnity the new procedure is introduced to the class. (It's interesting how intently children listen to any instructions involving the computer!) The "bare bones" ground rules are:

1. The order of turns follows the list of names as posted.
2. The timer is set for 10 minutes.
3. The child leaving the computer informs the next child listed on the name chart.
4. At the end of the day, the next child on the list writes his/her name on the board.

These four steps are simple, but will only work if all the "ifs" are taken care of as follows:

IF a child whose turn it is is otherwise occupied (in a reading group, receiving individual help, out of the room at the moment, etc.), that child's name is written on the board by the child leaving the computer and the next child on the list is called. (For example, it's Jenny's turn but she's at a speech lesson. Jack writes her name on the board and calls Kelly. When Kelly is finished, she checks the board and looks to see if Jenny is back. If she is back, Kelly calls her to take her turn. If she is still out of the room, the next child is called.)

IF the teacher begins a lesson with the whole class, or calls his/her reading group, the child at the computer checks the timer to see how much time is left and writes his/her name on the board with the remaining time next to it.

IF a program requires two children to be together at the computer, both children have had their turns.

IF a child is absent, that child's turn is skipped.

IF the timer goes off at a point where the child needs another minute or two to finish the game or save a procedure, that's fine. (If the privilege is abused, you'll hear about it soon enough!)

IF a child needs help at the computer, s/he asks a friend who is not working with the teacher.

The children quickly learn that class and group lessons take precedence over one's turn at the computer, but since each child is assured of fair treatment, they react good naturedly.

Introducing this routine will take about 20 minutes, and if it is followed up by inviting questions, the children will come up with some "What if . . ." questions that will help you refine and tailor it to your class.

Finally, it is advisable to monitor the new routine carefully for the first few days, offering reminders and reviewing the rules. The time spent during that first week will lay the groundwork that frees you from constant daily hassles and frequent settling of squabbles.

Don't turn off that computer—make it the willing partner it was intended to be! **END■**

[Doris M. Kneppel, 84 Cascade Way, Kinnelon, NJ 07405.]

Organizing Computer Use In The Classroom

☐Another method of scheduling individual computer time is to set up a timetable for the periods when the computer is available to you. Have the children pair up and select a time slot. Try to leave a few spaces during the week when children who have missed their time can have an opportunity to make it up.

☐Classrooms are less disrupted if children know they are, under no circumstances to interrupt the teacher during a lesson.

☐If you do not wish students absent from the class during a particular lesson time then block out that section from the timetable.

☐Team your older students so that when one partner is away at the computer the other partner is responsible for keeping track of assignments given or lessons taught.

☐Designate a few particularly interested students as "Computer Trouble Shooters". These individuals could be available at any time to assist students on the computer. A variation of this is to designate "Computer Experts" for particular programs. Those students could have the opportunity to spend more time with a particular program prior to it being used. Your students could then take turns being 'the expert'.

☐Be sure to keep your computer center equipped with up-to-date information regarding the programs in use. The "expert" mentioned above could be responsible for producing a chart or poster outlining the information required to use the program successfully.

☐Another option is to train a cadre of 'Big Buddies' who would be responsible for teaching the 'Little Buddies' how to use the different programs or training them initially in order that they could qualify for a 'Computer Users' certificate. All the 'Big Buddies' I've worked with over the years have responded exceedingly well to this type of challenge.

☐See excellent article in LOGO section by Shirley Torgerson, "Classroom Management For LOGO".

Females and Computers? Absolutely!

by
Maryann R. Marrapodi

[Editor's Note: Maryann Marrapodi was formerly director of math, science and computer science for District 4, Manhattan, where she became very aware of sex equity and computer use.]

In many educational communities, the refrain "publish or perish" has quickly segued into "purchase or perish." Reacting to the demands of parents, industry and students, schools are purchasing microcomputers at an unbelievable rate. Now that computers can be found in close to half the nation's schools, great concern is being voiced about their potential for creating greater inequities among our students. Recent reports indicate that these inequities do, in fact, exist. Geographic, economic, racial and gender-related gaps in computer use have been identified and must be addressed by educators.

The inequities are real and threaten the quality of education on a national level. Regional and economic disparities can be addressed by strong policy statements and federal assistance, but societally-generated inequities cannot. This is particularly true of the gender gap.

The societal issues leading to the gender gap in computer education are too complex to be addressed by one simple strategy. Rather, a combination of vigorous affirmative action strategies must be coupled with a strong support network in order to bring our female students into the mainstream of the world of technology.

Common Problems and Suggested Strategies in the Classroom

1. Boys are more aggressive users of computers than girls.
   - Provide a sign-up sheet for computer use. Be sure that girls and boys have equal time on the computer.
   - Assign female students to help train younger or new students in using the classroom computer. It is not necessary to be a "hack" to know how to load and run a computer program.
   - Ask girls, as well as boys, to demonstrate and explain their computer projects. Be sure to include female students when you demonstrate a new software package or a new programming concept.
   - Become aware of your own stereotyping. All boys are not more able with computers than all girls.
2. Software and computer-related print materials are written with male students in mind.
   - Review all commercial software packages for incidences of overt or subtle sexism. The subliminal messages found in instructional material is often more powerful than the stated objectives.
   - Be aware of the types of reinforcers used in educational software. The packages that use "shoot 'em ups," touchdowns, home runs or other traditionally gender-related rewards will appeal more to boys than to girls.
   - Provide a variety of books and periodicals that show males and females using computers in different ways. Be sure that the materials are free of sex stereotypes.

"Make a special effort to use computers in classes which are often viewed as non gender-specific by females. Use the computer with simulation programs in social studies, with graphic packages in art, and with word processing programs in English classes. Infuse computers into all curriculum areas."

---

3. Male students see the computer as very useful to their lives. Female students tend to view the computer as less useful.
   - Make a special effort to use computers in classes which are often viewed as non gender-specific by females. Use the computer with simulation programs in social studies, with graphic packages in art, and with word processing programs in English classes. Infuse computers into all curriculum areas.
   - Surround students with examples of how computers are used. Books, periodicals, films and bulletin board displays can be used to demonstrate how computers are used in education, health professions, business, industry, science and government. Be sure that these models show both males and females in active roles with the computer.
4. Girls tend to identify computing as a male activity.
   - Begin the use of computers in your school as early as possible. All reports indicate that girls and boys use computers equally in the early grades. The gender gap seems to appear with the onset of puberty.
   - There are many indications that the gender gap is reduced when Logo, rather than BASIC, is used to teach programming concepts. While there is no definitive report on this, the graphic nature of Logo seems to be more appealing to female students than an algebraic language such as BASIC.
   - Provide positive role models for your female students. Bulletin board displays should show men and women working with computers. Guest speakers should include computer professionals who are female.
5. Societal stereotypes affect classroom behaviors.
   - Have male and female students demonstrate computer use for their parents. Encourage female students to act as instructors for parent workshops.
   - Analyze advertisements in computer magazines with your class. Have your students write letters to those companies which employ blatant sexism in their ads.
   - Encourage parents of female children to consider the possibility of a computer camp for the summer.

In the past, math anxiety has limited career options for too many able females. Computerphobia will have an even more devastating effect on our female students. Fortunately, we are addressing the issue at a time when computers in the schools are still a relatively new phenomena. We will not repeat the mistake of excluding a large portion of our youngsters from the freedom of choosing their future roles in society. END■

[Maryann R. Marrapodi, Special Assistant to the Chancellor, New York City Public Schools.]

The Computing Teacher
Vol. 11 No. 6, April 1984
Pages 57-58

For further information and some excellent reading about computers and equity of all kinds refer to:

Computer Equity: Overview, Research and Practical Ideas

The Computing Teacher, Vol. 11, No. 8, April 1984

(Write Equity Issue, ICCE, University of Oregon, 1787 Agate St., Eugene, OR 97403-1923 and include $3.00 US funds for each copy.)

Software Evaluation

Section 5

SOFTWARE EVALUATION IS NEEDED

The most important skills needed to evaluate software are skills that we, as teachers, already possess. We understand the complex issues involved in any learning/teaching situation. We recognize important curriculum concepts. We understand how to structure a valuable learning experience and how important it is to give clear instructions.

What is needed is to take these skills and combine them with our new understandings of microcomputers and their special capabilities. A microcomputer can be used interactively. It can give direct feedback. It provides graphic modes of presenting information. It can access information directly, rather than sequentially. It performs calculations with incredible speed and reformats according to new commands almost instantly. One computer program can provide many different experiences, depending on the user's skills, knowledge and interest, and it can provide for user choice and control (Watt, 1982).

When we examine software for evaluation purposes we must look at such things as technical quality, ease of use, instructional quality, documentation and support from the vendor or dealer. As you gain experience with software from an educational perspective, you will develop your own criteria but for now you may use the TEACHER SOFTWARE EVALUATION CHECKLIST or develop one yourself.

Software is expensive and there is a lot of poor quality software in the marketplace. You must make your own decisions. Preview your software carefully. Get others on staff to preview it as well. Make sure it is good before you commit yourself to purchasing it or to using it. Be critical. If you have complaints or suggestions for improvement, take a few minutes and write to the producer. It can be worth it.

Teach your students to be critical as well. Just as you should make sure they always feel in control when they are using a computer so should they be trained to be critical software consumers. Ask them what they learn when they use a particular piece of software. Listen to them when they give you their answers. If you disagree, share your reasons with them. All consumers, young and old, should be critical of advertising. Teaching students to be critical of software could be the beginning of a 'consumer consciousness' among your students. There is a STUDENT EVALUATION form on page 54 however I encourage you to develop your own version along with your students for use in your classroom.

Watt, Molly. Making A Case For Software Evaluation in *The Computing Teacher* : May 1982.

Teacher Software Evaluation Checklist

Evaluated by:______________________ Date:__________

Title of Program:______________________________________

Producer:______________________________ **Price:**__________

Source/Vendor:______________________________________

Subject(s):______________________________________

Hardware Requirements:______________________________________

Support Materials Available:______________________________________

* * * * *

Audience (circle)

K 1 2 3 4 5 6 7 8 9 10 11 12 ADULT

Special Application(s):______________________________________

Subject Area:______________________________________

* * * * *

Technical Quality

YES NO

1. Does the program load and run correctly? ___ ___
2. Is it crash proof? ___ ___
3. Are the screen displays appealing and easy to read? ___ ___
4. Does the program make good use of the computer's capabilities? ___ ___

* * * * *

Ease of Use

1. Are the instructions clear? ___ ___
2. Can the user skip familiar instructions? ___ ___
3. Can the user return to familiar instructions? ___ ___
4. Can the user quit at any time? ___ ___
5. Is the material presented in a logical and easy to follow format? ___ ___
6. Can the student use the program without supervision? ___ ___

Instructional Quality

	YES	NO
1. Is the content correct and up to date?	___	___
2. Are spelling and grammar correct?	___	___
3. Are instructional strategies clear and appropriate?	___	___
4. Are the strategies used appropriate for the stated learning objectives?	___	___
5. Does the program meet its objectives?	___	___
6. Are the rewards for right and wrong answers appropriate?	___	___
7. Is the level of presentation (readibility, complexity) appropriate for the grade level?	___	___
8. Can students of varying ability enjoyably use the program?	___	___
9. Is the language/presentation free of sexual/racial/ and cultural bias?	___	___
10. Does the program provide tutorial help as needed?	___	___

* * * * *

Documentation

1. Does the documentation clearly explain how to operate the program?	___	___
2. Does documentation include teacher support materials, such as curriculum ideas?	___	___
3. Are there any other support materials, such as student workbooks, included in the package?	___	___

* * * * *

Vendor Support

1. Will the vendor replace defective materials?	___	___
2. Can the disk be duplicated?	___	___
3. Does the vendor provide back-up disks?	___	___
4. Does the vendor accept return of unsatisfactory or unsuitable products?	___	___

Comments:____

____

Disk Cover Evaluation Form

The form below can be xeroxed and used to evaluate software. Once completed they can be pasted onto the disk covers of the software set aside for teacher use and appraisal. Staff surveying the available disks will have some "quick and ready" information on which to base a preliminary decision.

PROGRAM NAME: ______________________________

Audience (circle)

K 1 2 3 4 5 6 7 8 9 10 11 12 ADULT

	Yes	No
Technical Quality		
1. Does the program load and run correctly?	___	___
2. Is it crash proof?	___	___
3. Are the screen displays appealing and easy to read?	___	___
4. Does the program make good use of the computer's capabilities?	___	___
Ease of Use		
1. Are the instructions clear?	___	___
2. Can the user skip familiar instructions?	___	___
3. Can the user return to familiar instructions?	___	___
4. Can the user quit at any time?	___	___
5. Is the material presented in a logical and easy to follow format?	___	___
6. Can the student use the program without supervision?	___	___
Instruction Quality		
1. Is the content correct and up to date?	___	___
2. Are spelling and grammar correct?	___	___
3. Are instructional strategies clear and appropriate?	___	___
4. Are the strategies used appropriate for the stated learning objectives?	___	___
5. Does the program meet its objectives?	___	___
6. Are the rewards for right and wrong answers appropriate?	___	___
7. Is the level of presentation (readability, complexity) appropriate for the grade level?	___	___
8. Can students of varying ability enjoyably use the program?	___	___
9. Do color, animation, and sound enhance the quality of the program?	___	___
10. Does the program provide tutorial help as needed?	___	___
Documentation		
1. Does the documentation clearly explain how to operate the program?	___	___
2. Does documentation include teacher support materials, such as curriculum ideas?	___	___
3. Are there any other support materials, such as student workbooks, included in the package?	___	___

Hints for Classroom Use

1. Subject Area ______________________________
2. Additional Materials ______________________________
3. Hardware Required ______________________________

Student Evaluation

Name: ______________________________

Class: ______________________ Grade: ____

Date of Evaluation: ______________________

Program Evaluator: ______________________

TECHNICAL QUALITY

	Yes	No
1. Does the program load and run correctly?	___	___
2. Is it crash proof?	___	___
3. Are the screen displays appealing and easy to read?	___	___
4. Does the program let you change your mind?	___	___
5. Can you stop the program easily?	___	___

EASE OF USE

	Yes	No
1. Are the instructions clear?	___	___
2. Can the user skip familiar instructions?	___	___
3. Can the user skip to instructions if necessary?	___	___
4. Is the material presented logically and in an easy to follow format?	___	___
5. Can you use the program without supervision?	___	___
6. Are spelling and grammar correct?	___	___
7. Is the program enjoyable to use?	___	___

COMMENTS

____

____

____

____

____

This program was...

EXCELLENT
GOOD
FAIR
TERRIBLE

Recommended Software Distributors

The following firms are companies that we have dealt with and have been found to give speedy and reliable service. They also permit the return of unsatisfactory products. There is room to expand this list as more and more companies agree to consumers demands for better service.

Please take the time to write a letter if the service has been unsatisfactory. Let the companies know why you're displeased and why you won't order from them again. As more and more consumers start to demand good service the situation will improve. If you are aware of additional companies that meet the following criteria, please share the information with your colleagues.

1. They accept on-approval orders for courseware, usually with the requirement that the on-approval order be accompanied by a check or purchase order to indicate serious intent to purchase the product if it is suitable.
2. Their catalogs offer instructional courseware produced by many different publishers for the microcomputers most frequently used in grades K - 12.
3. They screen the courseware listed and try to drop programs which users find unacceptable.
4. Their catalogs are free. (Lathrop, 1985)

Scholastic Book Services
123 Newkirk Rd. Richmond Hill
Ontario L4C 9Z9
Telephone Collect 416-883-5300

Compuwest Sales Inc.
P.O. Box 1353, Delta, B.C.
V4M 3Y8
Toll Free 1-800-663-0001
Collect 604-535-1817
(F.O.B. Vancouver)

Lathrop, A. & Marsh, J. Mail-Order Software Distributors with Liberal On-Approval Policies in **The Computing Teacher** Vol. 12, No. 9: p. 31-33)

Computer Education In Practice:

The Nitty Gritty Details

Section 6

Getting Down to Business

In this section you will find details regarding a variety of different types of programs and applications. Included, along with an explanation of how and why to use these programs or applications, is a sample lesson or in some cases, a mini-unit. The limited nature of this guide does not permit inclusion of a large number of units. However, it is hoped that these samples will give ideas for continuing on your own. Where appropriate I have made software and literature recommendations based on my personal experience.

Computer Assisted Learning

When most people think about children and computers they seem to think most often about those types of programs that can be qualified as a type of computer-assisted learning. These sorts of programs feature the child interacting with the computer but the computer program is controlling the interaction. This interaction can be contrasted with a word processing program which is controlled by the user.

As with all learning materials, it is important that the teacher select and evaluate computer-based instructional materials carefully. There continues to be a lot of poor software available in the market place. Further, no matter how good the program appears to be it is worthless unless it furthers your curricula goals. Two types of programs representative of computer-assisted learning are Drill and Practice programs and Simulations. Students, in well-rounded computer education programs will be exposed to both of these. The following section will elaborate with regard to the distinctive features of these programs, suggest ways in which you can evaluate them prior to using them and provide two sample units you can adapt for your classroom.

Drill and Practice Programs

These programs provide the student with practice of a particular skill or set of skills. They do not teach skills but rather reinforce skills that have already been taught.

Drill and Practice (con't)

They are used to meet the objectives of the computer education program as they can usually be operated independently. They serve as good models of how programmers can 'control' a user's actions. Poor examples of drill and practice software can be used in a worthwhile way by being used to provide students with a 'bad' experience. This permits the teacher to introduce students to the idea that some software is 'user-friendly' and some software is not. If they are having an unhappy experience at the computer they should turn it off and speak with you about it. They should be encouraged to *never* let themselves be controlled by a computer or a program. Humans should always be in control of technology.

Drill and Practice programs can provide much needed and interesting (novel) practice with skills that require never-ending amounts of drill. When used appropriately, they can be very successful. However, Drill and Practice programs should not be the major occupation of computers in your schools as it is really a waste of the computer's special capabilities.

Selection Criteria To Consider:

- ☐Is it a good use of limited funds or would a snazzy workbook be adequate?
- ☐Are the instructional objectives clearly stated?
- ☐Can it be easily integrated into the subject area curriculum?
- ☐Can the rates and difficulty levels be adjusted?
- ☐Is there random generation of problems?
- ☐Can the student operate it independently?
- ☐Is the manual useful?
- ☐Are there additional educational activities or blackline masters provided?
- ☐Are the educational techniques used sound?
- ☐Does the amount of learning justify the time required?
- ☐Is there appropriate use of colour, graphics and/or animation?
- ☐Does it accomplish the stated objectives?

One of the programs available at your Resource Center is a MECC program entitled, "MECC Primary". It is a collection of programs which drill the user on the upper and lower case alphabet, initial letters, memory and matching skills, counting up to nine objects, addition up to ten.

The following two lessons have been reprinted with permission from work done by Dr. Betty Collis for the Saanich Computer Project, Sannichton, British Columbia. They are representative of the kind of activities you can create to complement drill and practice software.

FIND THE NUMBERS

TEACHER NOTES:

INDEX TO PROGRAMS ON DISK

CATERPILLAR

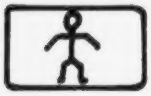
A DRILL ON THE UPPER CASE ALPHABET.

TRAIN

A DRILL ON THE LOWER CASE ALPHABET.

A IS FOR APPLE

A DRILL ON THE INITIAL LETTER USED TO SPELL A PICTURED WORD.

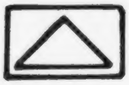


PICTURES

A CONCENTRATION TYPE OF MEMORY GAME USING PICTURES.

WORDS

A CONCENTRATION TYPE OF MEMORY GAME USING WORDS.



SHAPES

A CONCENTRATION TYPE OF MEMORY GAME USING COLORED GEOMETRIC SHAPES.

SMILE

A DRILL ON COUNTING IDENTICAL OBJECTS USING THE NUMBERS 1 - 9.

WUZZLE

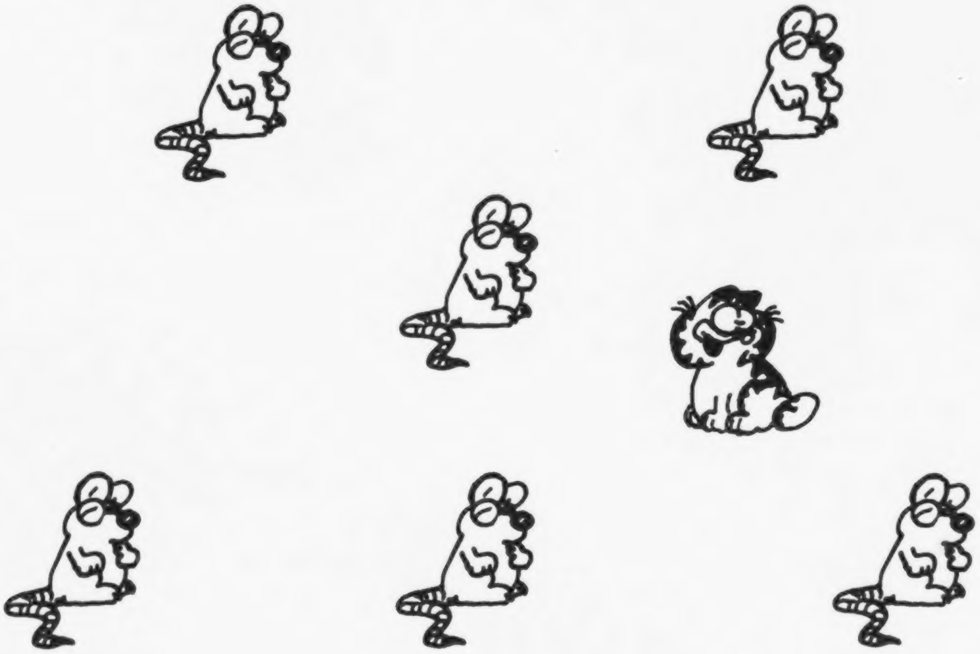
A DRILL ON COUNTING IDENTICAL OBJECTS IN A GROUP OF MIXED SHAPES.

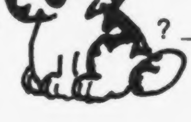
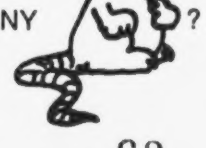
SPACESHIP

A DRILL ON ADDITION OF TWO GROUPS OF IDENTICAL OBJECTS USING SUMS OF 1 THROUGH 10.

FIND THE NUMBERS

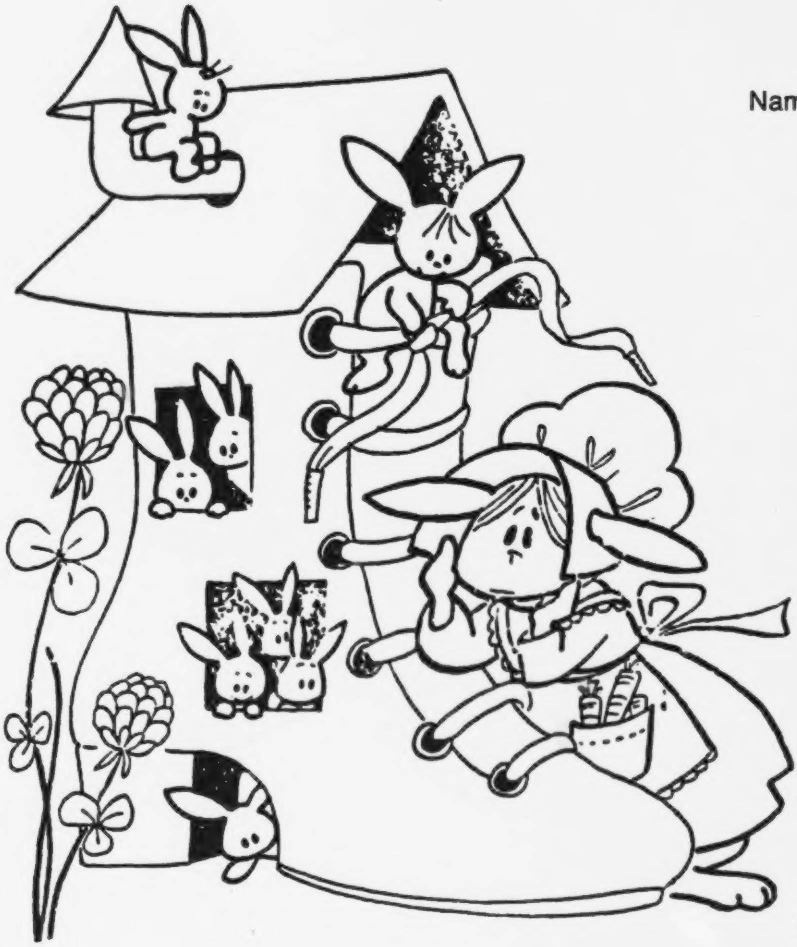
1. Put Disk 2 in the disk drive. Turn on the computer and the monitor.
2. When the MENU appears, choose | 8. WUZZLE |
3. When you are done with the program, do these:

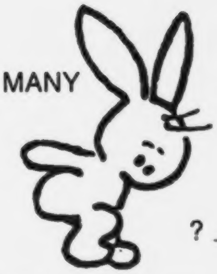


HOW MANY  ? ____________ HOW MANY  ? ____________

FIND THE NUMBERS

Name: ____________________



HOW MANY  ? ____________

COLOUR 2 FLOWERS.

COLOUR 3 CARROTS.

HOW MANY **C** ? ____________

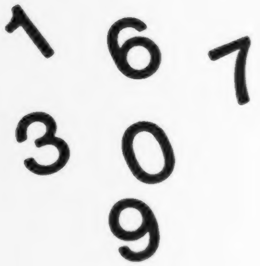
HOW MANY **E** ? ____________

HOW MANY **B** ? ____________

HOW MANY **N** ? ____________

DENNE-LYISVFEIRSBHECEHFIKCIK

FIND THE NUMBERS

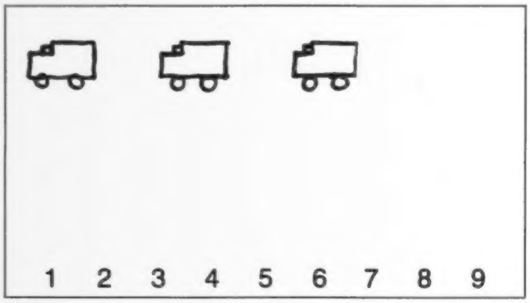


NAME: ______________________

1. PUT DISK 2 IN THE DISK DRIVE. TURN ON THE COMPUTER AND THE MONITOR.

2. WHEN THE MENU APPEARS, CHOOSE ☺ **7. SMILE**

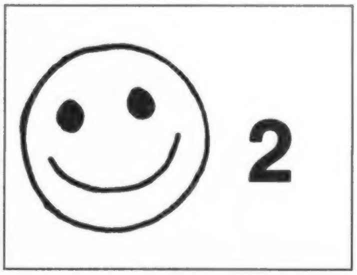
3. WHAT NUMBER SHOULD YOU TYPE IF YOU SEE THIS DISPLAY? ____________



WHAT DISPLAY DO YOU SEE IF YOU TYPE THE RIGHT NUMBER?

4. DRAW THE DISPLAY

1 2 3 4 5 6 7 8 9



5. WHEN YOU ARE DONE WITH **FIND THE NUMBERS,** PRESS

ESC

FIND THE NUMBERS

TEACHER NOTES:

☺ SMILE

COUNTING OBJECTS

Specific Topics:	Mathematics (counting)
Type:	Drill and Practice
Reading Level:	Pre-Reading
Grade Level:	Preschool - 1st Grade

DESCRIPTION

SMILE provides practice in counting objects. Several identical objects appear on the screen, with the number of objects randomly varying from one through nine. The numbers 1-9 are printed along the bottom of the screen. The student types in the numeral corresponding to the number of objects shown.

OBJECTIVES:

1. To count objects numbering from one through nine.
2. To identify the numeral which represents the number of objects.

FIND THE NUMBERS

TEACHER NOTES:

WUZZLE

COUNTING MIXED OBJECTS

Specific Topics:	Mathematics (counting)
Type:	Drill
Reading Level:	Pre-Reading
Grade Level:	Preschool - 1st Grade

DESCRIPTION

WUZZLE provides practice in counting objects in a group of mixed shapes. A number of displays of two different kinds of objects, e.g., houses and trees, appear on the screen. The question "how many   ?" (with the appropriate object shown) is printed at the bottom of the screen. The student then counts the objects and types in the corresponding numeral.

OBJECTIVES:

1. To count objects numbering one through nine.

2. To identify the numeral which represents the number of objects.

3. To distinguish between two types of objects, counting only the one type requested.

Simulation Programs

Simulations are powerful techniques for increasing student motivation and understanding and their participation in learning. They often incorporate a game format that has the student taking on a role or competing either against the computer or against another student. Often, results depend on an element of 'real life' chance rather than only on skill or expertise alone.

Simulations permit students to engage in activities that s/he is unable to participate in for a variety of reasons. For example, students can be fish playing their part in an ecosystem, driving a vehicle while intoxicated, operating a plane or a King of a country. The choices seem to be almost endless.

The quality of the programs vary as does their relationship with the curriculum. Some of them provide excellent opportunities to use the computer to further goals in Science, Social Studies, Mathematics, or simply as a computer education experience. They can be used as a part of a unit: the introduction, the culmination or one of several activities comprising the unit. Prior to using a simulation program in your classroom you should be sure to preview it and consider whether it will make a contribution to the instructional activities presented to your students.

Selection Criteria To Consider:

☐Is there high student involvement?
☐Does it provide students with an adequate summary of performance?
☐Does it exhibit racial or sexual discrimination?
☐Is its language appropriate?
☐Does it encourage cooperation?
☐Does the student have appropriate control over the presentation?
☐Is the time required appropriate?
☐Are the instructional objectives clearly stated?
☐Are there suggestions for integration into the curriculum?
☐Are prerequisite skills for students indicated?
☐Are there useful student activities recommended and/or blackline masters?
☐Are there useful followup suggestions included?

One of the programs available at your Resource Center is a MECC program entitled "Odell Lake" found on a disk entitled, " Science Vol. 3 Version 4.5 ". The following mini-unit has been reprinted with permission from work done by Dr. Betty Collis for the Saanich Computer Project, Saanchton, British Columbia. It is representative of the kind of activities or units you can create to complement simulation software and your curricula.

FISH IN ODELL LAKE

WHY USE THIS PROGRAM?

Science Curriculum

To visualize the relationships between different species of fish.

To identify the preferred food of each species of fish.

To develop the concept of a food chain.

To predict the preferred habitat of each species of fish in Odell Lake.

To demonstrate the vocabulary terms **dominant, species, predator** and **prey.**

To demonstrate fish survival based both on instinctive behaviour and natural and chance events.

Computer Curriculum

To experience a role-playing simulation on the computer.

WHEN TO USE THIS PROGRAM

Grade 3 — Fish (Science)
Grade 5 — Interdependence of Living Things (Science)
Grade 6 — Populations (Science)

HOW TO USE THIS PROGRAM

In a whole-class setting, demonstrate the program. Have groups of children each simulate one of the six species of fish; each group of children should be able to describe its fish with reference to the fish's preferred food, most likely habitat in the lake, and relationship to each of the other species of fish in the program.

FISH IN ODELL LAKE

BACKGROUND INFORMATION

To aid in understanding food chains through observing relationships in Lake Odell, the computer program provides role-playing of the following fish:

1. whitefish
2. chub
3. blueback salmon
4. rainbow trout
5. mackinaw trout
6. dolly varden

While role-playing one of the above fish, large birds, mammals, other fish, plankton, and insects will be encountered. In an encounter a decision must be made to:

1. Attempt to escape to deeper water
2. Attempt to escape in the shallow water
3. Ignore the encounter
4. Attack and attempt to prey
5. Attempt to chase out of the territory

Each fish has the same series of encounters except for that of its own species. Chub, for example:

a) eat plankton, water, and insects.
b) can ignore whitefish, blueback salmon, and rainbow trout.
c) are eaten by mackinaw trout and dolly varden.

When fish pass up three chances to eat, they may starve to death. Even with the right choices:

The odds for a small fish getting away from mackinaw trout in deep water are 4 out of 5.

The odds for a fish being caught by a fisherman's hook when eating water insects are 3 out of 20.

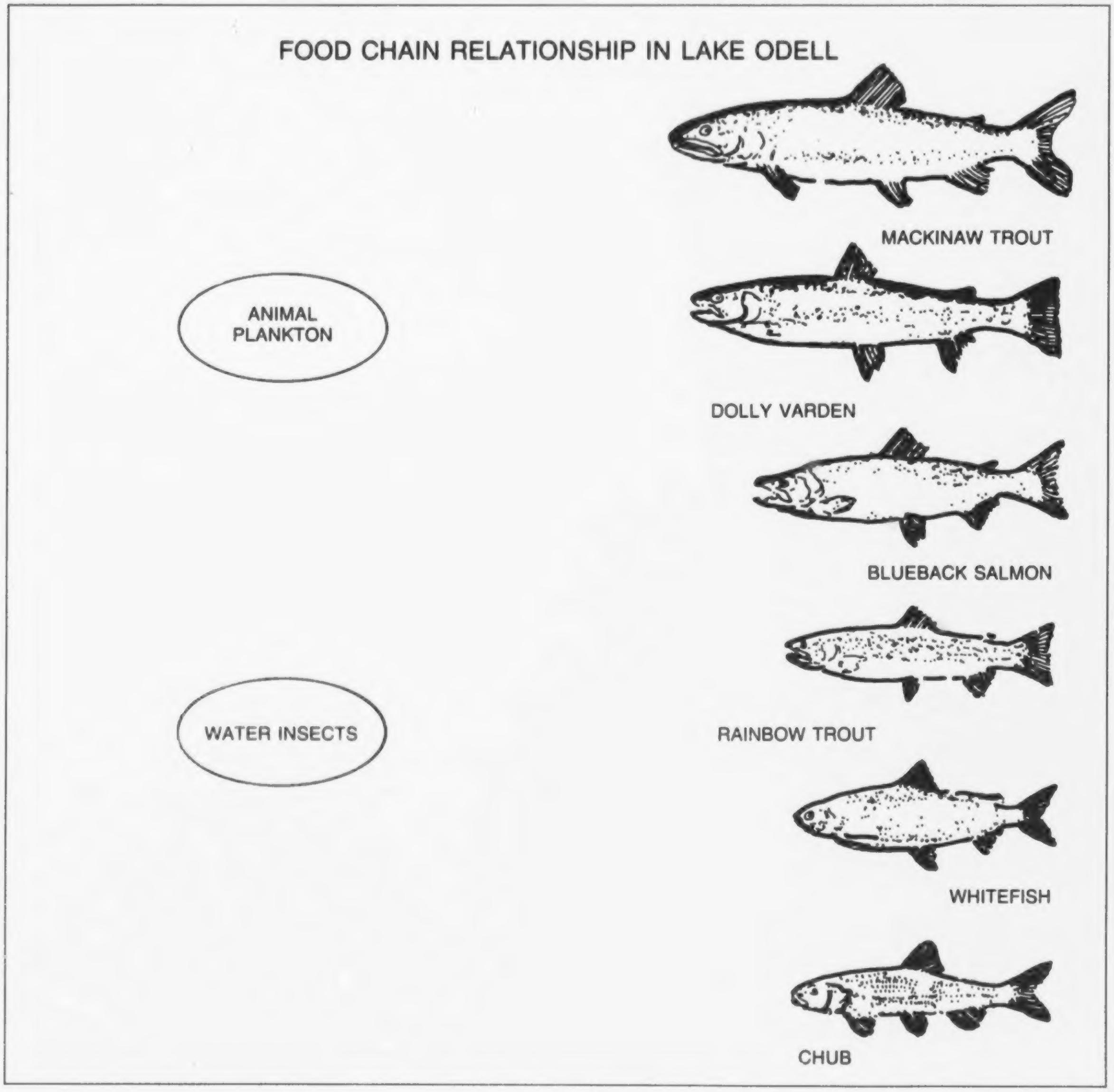
The odds for a fish being caught in a fish trap while eating animal plankton are 1 out of 4.

---

* Two reproducible student worksheets follow.

FISH IN ODELL LAKE

Name: ______________________________


FOOD CHAIN RELATIONSHIP IN LAKE ODELL

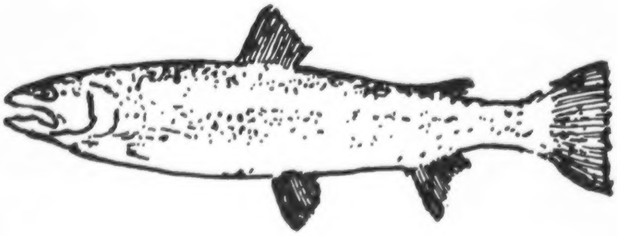
ANIMAL PLANKTON
WATER INSECTS
MACKINAW TROUT
DOLLY VARDEN
BLUEBACK SALMON
RAINBOW TROUT
WHITEFISH
CHUB

Use this sheet to help you make notes on the food chain relationship in Odell Lake. Who eats what?

FISH IN ODELL LAKE

Your Fish? ______________________ Name: ______________________

Whitefish
Chub
Blueback Salmon
Rainbow Trout
Mackinaw Trout
Dolly Varden



Does your fish have any enemies?
List them here:

Did anything happen to your fish when it was eating water insects?

____

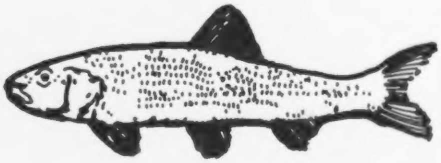
Did anything happen to your fish when it was eating animal plankton?

____

____

What does your fish like to eat?

(If your fish did not get a chance to eat water insects or animal plankton, run the program again and try not to get eaten by other fish!)



Where in Odell Lake would your fish prefer to live?
(What is its **preferred habitat**?)

Problem Solving And Computers

Problem solving skills are valuable and important to teach students in order that they are prepared to live in an increasingly complex world. Instead of training students to pass multiple choice tests or letting them rely on intuition or mimicry, it is far preferable to give them a series of challenges that require logical thinking. Along with the challenges we must provide instruction as to how to sort information, how and when to store information for recall, how to approach analyzing the problem, how to formulate and test hypotheses, and how to build a mental model that illustrates the solution(s). Problem solving strategies can give the child practice in spotting causal relationships and planning ahead.

While providing practice with problem solving skills, good software will call for patience, persistence and the ability to tolerate repeated failure. Since computers respond to actions in a non-judgemental manner or "environment", they are not threatening to students. Computers can engage students in an intellectual game that results in the player thinking about what is happening, planning ahead and enjoying the mind-stretching that accompanies the challenges of play.

Most computer-oriented problem solving has been labeled programming' up until recently. Logo, BASIC, and flowcharting all claim to teach problem solving skills. Whether they do or not has not been proven . However, there are more and more programs being produced which claim to teach problem solving outside of the realm of programming.

One program, **The Incredible Laboratory** places the student in the role of a scientist creating monsters in a laboratory. By selecting from a list of chemicals, a monster is created with features such as a green head, cowboy boots and a scaly body. The student must determine which chemical was used to create each part. The teacher's guide features lessons for both in the classroom and on the computer. These lessons focus on two strategies: successive scanning (trial and error) and note taking. (If you have purchased this program recently you should check to be sure you have the latest version. They asked for all disks to be exchanged as they improved sections of the program that operated a little too slowly.)

The following lesson is the first lesson designed to be used by the student individually or in small groups. Lessons up to this point in the guide have had a whole class focus. This lesson is reprinted with permission from Sunburst Communications.

THE INCREDIBLE LABORATORY
Software Lesson -- Novice Section

Skill or Strategy: Taking Notes
Using Process of Elimination

Grade: 3-8

Materials Needed: Worksheet 3

Preparation: Set up the computer and make a schedule for its use.

Prerequisite: Lessons on note taking, trial and error, and elimination.

* * * * *

LESSON PLAN

Introduction

Make sure all the students know the objective of the program. Explain that they will be working with five chemicals: Alien Oil, Goose Grease, Yellow Rind, Black Ice, and Sparkles. Tell them that the chemicals are not real. Explain that each chemical makes a certain part of the monster. If a chemical that makes a head is not chosen, the computer will put any head on the monster. (It could also be the head made by the chemical listed.)

Ask students to think about their strategies. How will they determine what each chemical does? Also, ask them to note how many monsters they needed in order to discover the effects of each chemical.

Using the Program

Decide upon the extent to which you want to structure the students' thinking. You may want to let students develop their own worksheets/notes and compare the different methods they use. If you decide upon a higher level of structure, copy and distribute Worksheet 3.

Have students use the program individually or in groups of two. One student could use the program while talking out loud about his/her thinking process, while another student who has already completed the program could take notes on what the first person was thinking.

Follow-Up

1. If students used the worksheet, ask them:
"Did the worksheet help you? Why?"

If students did not use the worksheet, ask them:
"How did you organize your notes?"

2. Ask different students to talk about the strategies they used. Discuss different strategies. What are the advantages and disadvantages of each?

For example, one strategy would be to use all the chemicals and produce a monster. You know that all parts are part of your final monster. Now create monsters using only one chemical at a time and identify what it does. Or start with two or three chemicals. How could this shorten the number of times you need to make the monster? The number of variables you introduce will depend upon the ages of the group members. However, discussing strategies and different approaches is an invaluable learning experience for the students.

THE INCREDIBLE LABORATORY WORKSHEET 3

NOVICE SECTION

Number of Monsters made___________________

Cross off a part when you know that a chemical did not create it.

Sparkles	Head	Body	Arms	Legs	Feet
Alien Oil	Head	Body	Arms	Legs	Feet
Black Ice	Head	Body	Arms	Legs	Feet
Goose Grease	Head	Body	Arms	Legs	Feet
Yellow Rind	Head	Body	Arms	Legs	Feet

DESCRIPTION CHEMICAL

The head looks like_______________and is created by_______________.

The body looks like_______________and is created by_______________.

The arms look like________________and are created by______________.

The legs look like________________and are created by______________.

The feet look like________________and are created by______________.

Flowcharting

Flowcharts are the pictorial representations of computer programs. They are used to help plan the steps in a program. Flowcharting assists children to organize actions and sequence events. Skills needed to flowchart in any area include identifying the main idea, identifying supporting details, sequencing ideas or statements and distinguishing relevant from irrelevant facts.

A unit on flowcharting is included in the Elementary Computer Literacy Integrated Teaching Unit produced by Alberta Curriculum (1983). It should be available as a handout included in this package. The applicable pages are 113 - 122.

In an attempt to provide something a little more unusual and in the realm of Language Arts, I have adapted suggestions found in an article by Shelley B. Wepner entitled, "Computer Flowcharts: Road Maps To Reading skills." It was published in the Fall issue (1983) of Computers, Reading and Language Arts (Vol. 1 No. 2).

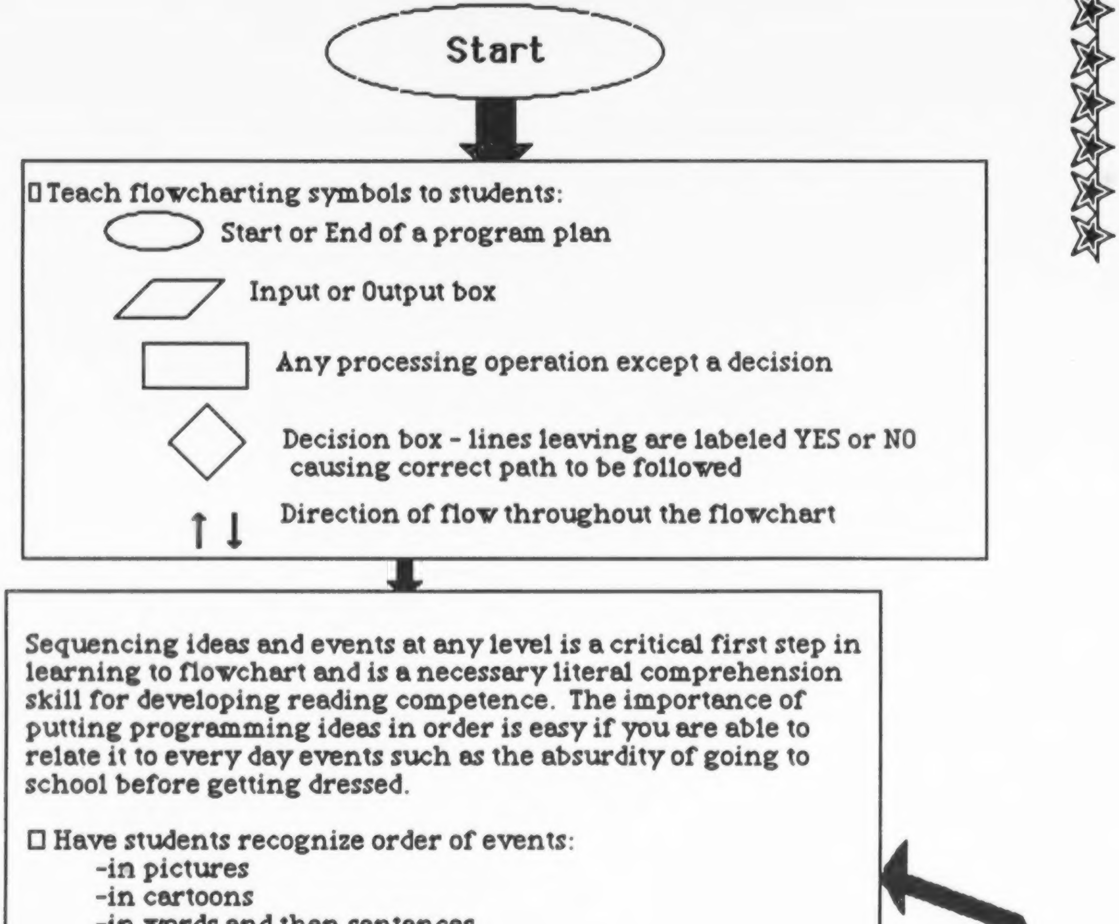
Software Suggestion

STORY TREE

This program encourages the use of flowcharts as an assist in the writing of "Choose Your Own Adventure" stories. It is a highly motivating and educationally worthwhile program for students to use. It encourages not only planning but pre-writing, writing and word processing skills.

(Recommended for use Grades 4 - 9)

Flowcharting



☐ Teach flowcharting symbols to students:

Start or End of a program plan

Input or Output box

Any processing operation except a decision

Decision box - lines leaving are labeled YES or NO causing correct path to be followed

Direction of flow throughout the flowchart

Sequencing ideas and events at any level is a critical first step in learning to flowchart and is a necessary literal comprehension skill for developing reading competence. The importance of putting programming ideas in order is easy if you are able to relate it to every day events such as the absurdity of going to school before getting dressed.

☐ Have students recognize order of events:
  - -in pictures
  - -in cartoons
  - -in words and then sentences
  - -in paragraphs

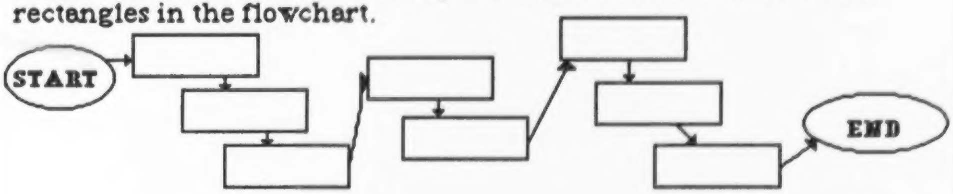
Have students tell the order and their rationale for such order.

☐Have the students devise and sequence their own ideas such a making a bed or riding a bike.

Are the students able to sequence a variety of events, both pictorial and written, correctly and with confidence?

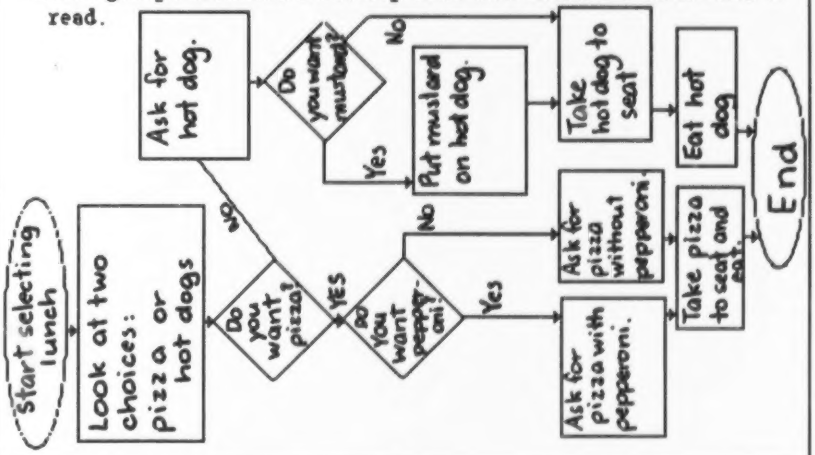
This exercise eases students into using flowcharts to organize ideas into sequential order. Aside from sequencing ideas, it can be used for organizing the main idea, identifying supporting details, identifying & using symbols, diagrams and typographical aids, and identifying key or direction words.

☐Make a flowchart with empty rectangular boxes.
☐Beneath the flowchart write down six to nine steps, in jumbled order, for any activity.
☐Have students cut them out and paste them in correct order on the rectangles in the flowchart.



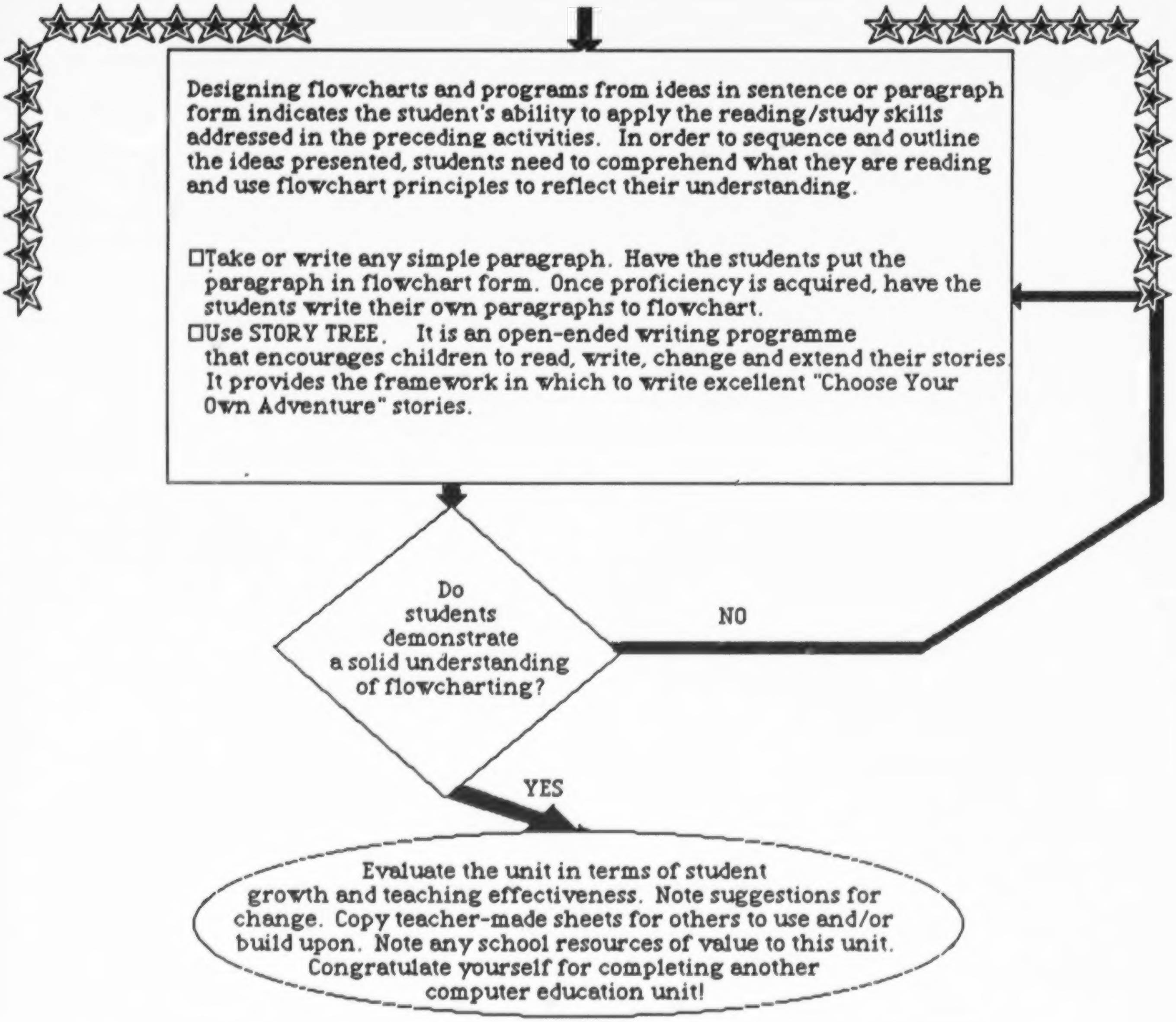
This activity allows students to focus on using flowcharting symbols correctly. It also helps students to follow the flowchart flow when decisions are included. Skills addressed include those from previous steps plus: using punctuation to obtain meaning, identifying cause and effect relationships, evaluating logic and consistency, relating supporting details to main ideas and following main point of directions sequentially.

☐Write down steps for doing an activity in flowchart form. Select an activity where choices are involved.
☐Frame the steps with correct flowcharting symbols.
☐Read the chart with the the class.
☐Have groups of students develop their own charts for each other to read.


Start selecting lunch
Look at two choices: pizza or hot dogs
Do you want pizza?
NO
YES
Ask for hot dog.
Do you want mustard?
No
Yes
Put mustard on hot dog.
Take hot dog to seat
Eat hot dog
Do you want pepperoni?
No
Yes
Ask for pizza without pepperoni.
Ask for pizza with pepperoni.
Take pizza to seat and eat.
End

Answering questions about the flow of events in a flowchart indicates the student's ability to read and understand the chart. It provides opportunities to think about the order of events. Once students are able to answer simple comprehension questions, more difficult questions and assignments can be formulated.

☐Create a flowchart for any activity or area of interest.
☐Formulate questions for students to answer about the flowchart.
☐Create a variety of increasingly difficult, but interesting, flowcharts to read.



Designing flowcharts and programs from ideas in sentence or paragraph form indicates the student's ability to apply the reading/study skills addressed in the preceding activities. In order to sequence and outline the ideas presented, students need to comprehend what they are reading and use flowchart principles to reflect their understanding.

☐Take or write any simple paragraph. Have the students put the paragraph in flowchart form. Once proficiency is acquired, have the students write their own paragraphs to flowchart.

☐Use STORY TREE. It is an open-ended writing programme that encourages children to read, write, change and extend their stories. It provides the framework in which to write excellent "Choose Your Own Adventure" stories.

Do students demonstrate a solid understanding of flowcharting?

Evaluate the unit in terms of student growth and teaching effectiveness. Note suggestions for change. Copy teacher-made sheets for others to use and/or build upon. Note any school resources of value to this unit. Congratulate yourself for completing another computer education unit!

SUGGESTIONS/SCHOOL RESOURCES:

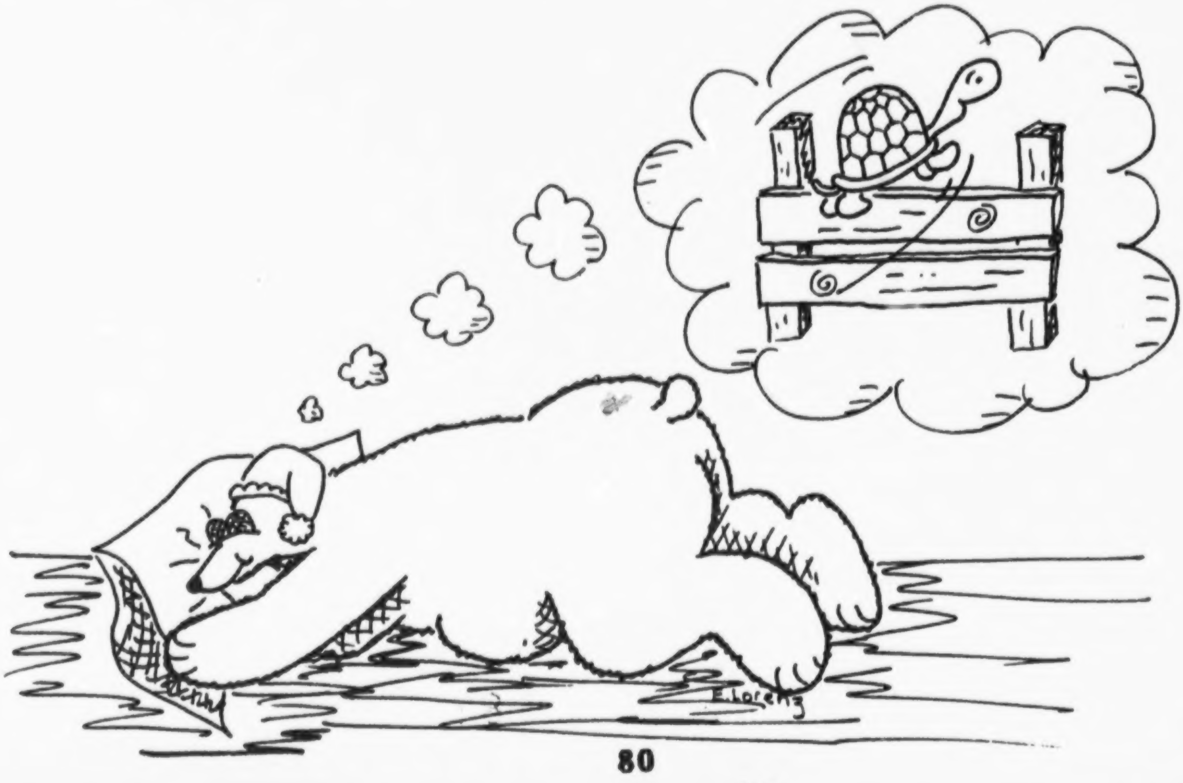
Logo

Logo is a computer language developed at Massachusetts Institute of Technology under the leadership of Seymour Papert. Bearden, Martin, and Muller in their book entitled, "The Turtle's Sourcebook" (1983) provides the following account of what Logo is and what working with Logo is all about.

> Logo is an enjoyable computer language reminiscent of the game of chess. And like chess it can be used as a valuable learning tool, or it can merely be another computer language.
>
> Very young children can quickly learn the basic chess moves and enjoy playing the game. Then they can spend the rest of their lives exploring the intricacies of chess, discovering new opening, middle and end-game strategies.
>
> Business school and military colleges have long accepted the value of chess as an educational tool. Fundamental to the learning process is the physical act of strategically moving the pieces around the board, exploring and experiencing different combinations of moves, and their possible consequences., in a structured and competitive environment.
>
> Just as it is fun to play chess, it is fun to "play" the computer. It is fun to start with what you know, and then discover new things you can do with that knowledge and experience. It is fun to create simple shapes and then assemble these into increasingly complex drawings.
>
> Logo is a very friendly, structured, procedural language through which users become very actively involved with the computer after only a few minutes of indoctrination. While it is enjoyable and exciting to the very young, Logo is a limitless language. If you want the computer to do something, you simply teach it how. However, the preconditioning of many adults will simply not allow them to accept such a simple, seemingly infinite concept.
>
> Einstein once stated, "Imagination is more powerful than knowledge." Programming in Logo is a fascinating exercise in imaginative thinking. Imaginative thinking doesn't mean fanciful dreaming at the computer. Rather, it refers to true creative thinking where Mathematics, geometry, logical operations, and list processing become tools for discovering new intellectual growth opportunities.
>
> Where other programming languages have infinite lists of commands which cannot be expanded, Logo uses simple primitive commands with which the user can define an entirely new language. Logo variables can be numbers, character strings, or lists. Logo procedures become new Logo commands which can act independently and "talk" to one another, acting at the command of another.
>
> Probably the most exciting feature of Logo is its interactivity. Whatever the user enters on the keyboard happens on the screen immediately, whether it is a command or an entire procedure. It is this interactivity that helps young people see and feel the complex concepts with which they are working.

> ...Logo provides children and adults alike with a descriptive computer language through which they can tell the computer how to structure their own combinations of moves, then explore how to extend them into increasingly more complex operations. When their descriptions are inadequate - a bug in the system - the computer simply doesn't do as expected. Then they must rethink their descriptions and try again.
>
> It is this rethinking process - the debugging of procedures - which helps children become clear, precise, logical and confident thinkers.
>
> ...The most important aspect of this learning environment is that possibly for the first time in their lives, these children are in control of their destiny. Where once there was a self-destructive, totally negative attitude about learning, these children can move at their own pace, in their own good time. They make the decisions, their own success or failure. Far more importantly, THE MEASURE OF THAT SUCCESS IS THEIR OWN.

The following pages summarize all the objectives related to Logo and procedures. Three references have been crossmatched with the objectives. The table which outlines the result of the crossmatching should assist you to select a text(s) and be confident that the objectives you seek assistance with will be represented adequately.



Objectives Related To LOGO and Procedures

Computer Objectives	**Computer Objectives (Translated Version)**
1. Describe procedures used to perform a task.	1. The child can list and detail the parts of the task in sequence.
2. Follow a procedure for a familiar task.	2. The child can break a routine into a logical sequence of steps.
3. Show different procedures can produce the same outcome	3. The child can, for example, make the same shape or complete the same activity while using a different sequence of steps.
4. Find and correct errors in a procedure	4. The child can find errors of sequence or identify missing steps and make necessary adjustments.
5. Modify a procedure to produce a different outcome	5. The child can change the sequence of steps (procedures) to produce a different result or to account for new variables.
6. Use a Micro-world such as Instant Logo or E.Z. Logo.	6. These procedures allow young children to use Logo with very little assistance.
7. Write simple procedures in Logo using basic Logo commands.	7. The child can direct the turtle to create a design.
8. Break a problem into smaller chunks or subproblems; plan procedures and subprocedures	8. The child can look at a desired design and visually break it into smaller chunks of work. For example, a house is a square, a triangle and two different rectangles.
9. Develop a procedure involving repetition and demonstrate that it works	9. The child will be able to use a simple design to create more complex designs through repetition.
10. Find and correct errors in a procedure. Use editing commands to correct procedures. Explain simple error messages.	10. The child should have lots of practice both on and off the computer. Debugging procedures is a worthwhile and indeed honourable activity in programming.
11. Use procedures to perform new tasks.	11. The child is able to, for example, make a box and then incorporporate it into a house design.
12. Apply procedure skills to new problems.	12. The child is able to approach tasks either within Logo or in daily life and solve problems by developing a step by step approach similiar to that used during programming.

13. Write a procedure using variables.	13. Write a procedure that has an element that can be readily changed. For example: Box: Side is the name of a procedure which will permit the user to easily substitute different values for 'side'. This can be compared to math equations that demand the student find the value of X . In this case, the student requests the turtle to show the effect of changes in X.
14. Write a procedure(s) in LOGO with multiple inputs	14. A child will be able to use a procedure that will result in, for example, the same shape but different side lengths and angle values.
15. Write a simple text program.	15. A child will be able to use Logo to write a simple program that results in text rather that geometric shapes.
16. Demonstrate the application of problem-solving strategies by writing a procedure(s) to solve an assigned problem.	16. The child is able to write a program to produce a specific shape or pattern. The child demonstrates approaches that facilitate the finding of a solution.
17. Note the differences between procedures for people and procedures for computers.	17. Computers are inflexible, unemotional, have no moral values...
18. Explain the concept of programming in terms of procedures and LOGO.	18. A child will be able to explain that a program is a series of logically sequenced instructions that a computer can understand and follow.
19. Design a graphics and text program.	19. A student must be able to combine list processing and turtle graphics to produce a program.

LOGO
Teaching Suggestions/Materials

Obj. No.	**My Students Use Computers** By Beverly Hunter Reston Publishing 1983	**Learning With Logo** or **Learning With Apple Logo** By Daniel Watt, 1983/4	**Logo In The Classroom** Shirley Torgerson Published by ICCE Eugene, Oregon 1984
1 2 3 4 5	P. 54 - 83 Collection of lessons to introduce, teach, and reinforce objectives.	p. 22 - 33 Lots of suggestions and ideas... all wrapped up in excellent techniques for talking about Logo with Logo learners	Sessions 1 - 3 P. 13 - 24 Comprehensive text introducing Logo into an elementary classroom with one computer and thirty children.
6 7 8 9	P. 93 - 102 Collection of five Logo lessons that address the curriculum objectives.	p. 22 - 39 p. 56 - 74 p. 76 - 94 p. 102 - 118 Children should be encouraged/challenged to create additional designs.	Sessions 4 - 12 p. 21 - 96 These lessons will provide additional geometry work. Be careful not to overdo the TEACHING of angles and degrees. The children learn quickly while experimenting onthe computer.
10 11 12 13 14 15 16	p. 161 - 167 Four excellent lesson plans dealing with •variables •loops •conditional loops •using decimal numbers	p. 112 - 149 p. 150 - 175 This text has lots of ideas for extending Logo. It's easy to follow and a joy to work with.	Sessions 12 - 20 p. 90 - 156 These lessons will assist in explaining the concepts and provide teaching ideas. You, as a teacher, will need to spend time on the computer following the directions prior to teaching the lesson(s).

Other excellent texts: 1,2,3,My Computer and Me and The Turtle's Sourcebook (See References)

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Classroom Management for Logo

by
Shirley Torgerson

The coming of Logo brings a mixture of excitement and hesitancy to many teachers in self-contained classrooms. It is exciting to contemplate all the ways Logo enhances the curriculum and helps develop concepts and skills. The hesitancy begins when the day actually arrives.

We at Paxson were faced with one computer for 20-30 students.[1] Our experience may be helpful to other teachers using Logo in the classroom for the first time.

A discussion of classroom organization and management techniques using Logo in an elementary classroom is incomplete without a rationale for choosing Logo as the principal use of a computer.

Elementary teachers are well aware of the importance of a student's early years in establishing thinking patterns and approaches to solving problems. D. Benjamin Bloom, University of Chicago, stated in a summary of 1000 research studies:

> Put in terms of intelligence measured at age 17, from conception to age 4 the individual develops 50% of his/her mature intelligence; from age 4 to 8 s/he develops another 30%; and from ages 8 to 17, the remaining 20%.[2]

Basic habits and skills established in the elementary grades have great impact on students' success in school later on. They develop individual styles of thinking through their actions on the environment and from the feedback they receive. A Logo environment encourages the development of these skills. Young children learn spatial relationships first through their own bodily involvement in spatial movements. The turtle provides an object for extending these concepts into complex movements that go beyond children's own physical abilities, at the same time allowing children control over the action. Such control allows the child to repeat actions for the feedback necessary to assimilate new concepts into his/her own mental structures.

Logo provides an activity-based setting for developing important and sometimes difficult-to-teach concepts such as sequencing, patterning, estimating, probability, measuring, graphing, coordinate systems, simplifying, language arts activities, communication skills and geometric concepts. It is a powerful, motivating medium that fosters development of thinking skills and problem-solving strategies.

Logo became an integral part of our classroom after we had answered seven questions. The immediate question was:

WHERE WILL I PUT THE COMPUTER?

The computer should be placed to serve the needs of the class and of each student user.

Privacy

Think back upon your first contact with a computer. You might recall your hesitancy because others were watching. Children as well as adults are sometimes unwilling to risk trying something new in the presence of others for fear of making a foolish error. Others may simply be so conscious of classmates observing them that they cannot concentrate on their own task. Watching the Logo action on the screen is also tempting for those working on other assignments. Placing the computer in a corner of the room allows for a degree of privacy while permitting the user to hear important announcements.

Access for Demonstrations

The computer will sometimes be used for demonstrations such as teaching a new primitive or explaining a subject matter concept. The computer should be located where it can easily be turned, without dismantling, for good whole-class viewing.

Glare

When considering placement of the computer, consider glare from windows. A screen that faces a window reflects the light, making it difficult to see the screen image. Likewise, if the viewer faces a window, it is difficult to look at the darker image.

Once the computer is set up in a good location, Logo is ready to become an integral part of the classroom.

HOW DOES LOGO FIT INTO THE DAILY SCHEDULE?

One of the first questions entering a teacher's mind is usually, "How do I find time to add one more thing to my crowded schedule?" In recent years, schools have assumed so much responsibility for students' total education, development and socialization that instructional time is precious. However, a half-hour Logo lesson now has the potential for saving a child hours later on in school. Geometry concepts, language arts skills and problem-solving strategies can be introduced and developed while giving students the opportunity to become "computer literate." Rearranging the daily schedule once a week may yield the needed half-hour. Considering the correlation with mathematics and language arts, perhaps Logo could use fifteen minutes from each once a week, or students may agree to extra homework one night a week to compensate for the "lost" time. A half-hour, whole-class lesson presented once a week will introduce students to the Logo primitives and some beginning programming constructs. As they become proficient in using the language, Logo can become a tool for learning subject matter, developing skills and reinforcing concepts.

HOW DO I CYCLE CHILDREN ON TO THE COMPUTER WITHOUT LOSING VALUABLE INSTRUCTIONAL TIME?

Most teachers have some kind of system using sign-up charts or schedules for individualized activities. At Paxson, we use a TIME-ON chart, so the computer can be used most of the day. The 22"x28" poster board chart is divided into five columns, one column for each school day, with horizontal lines representing half-hour time slots. The chart is laminated so student names can be entered with water-based markers and easily changed from week to week.

The half-hour slots are marked on the left side of the chart. Time slots not available for computer use (library time, gym classes, music class, field trips, introduction of new concepts, etc.) are marked off. On Monday, each student selects one time slot. After all students have selected one time, a second turn is allowed—a procedure which gives all children a chance at selecting the preferred computer times. Since students occasionally miss their designated time due to illness or unexpected interruptions, a few slots are left open on Fridays.

Depending on class size and length of the school day, this system should permit each student to have two half-hour slots per week with any extra time given to pairs of students. (In larger classes, two children might share the second block of time.)

A small clock by the computer lets the students know when their time is up. That user is then responsible for reminding the next student scheduled to use the computer. This helps minimize "clock-watching" by the next student and increases concentration on the current task. Students move quietly to and from the computer without disturbing the rest of the class or the teacher.

WILL KEEPING TRACK OF MISSED ASSIGNMENTS MEAN MORE RECORD-KEEPING?

A partner system frees the teacher from keeping track of who missed what during computer time. While one student works at the computer, his/her partner keeps track of assignments, turns in finished work and collects passed-out materials. If a laminated chart listing partners is used, they can be changed periodically. Students at Paxson also made construction paper folders in which to keep all papers and notes for their partners. It should be noted that partners are responsible for explaining minor tasks but not important concepts. The introduction of new ideas normally requires full class participation. Partners cannot share computer time, and a student at the computer cannot go to his/her partner for help. The partner system has an added benefit—it works equally well when students are absent from school.

WHERE CAN THE STUDENT AT THE COMPUTER GO FOR HELP WITHOUT DISTURBING THE TEACHER?

Resource charts, including a quick reference chart listing primitives with any abbreviations, are posted in the computer corner. This minimizes the need for help and encourages students to work independently at the computer. Charts serve as references for colors, keyboard characters, editing functions and hardware. An in-depth listing of already-introduced primitives is kept in a notebook on the computer table. This listing shows the correct way to type each command and explains in easy-to-understand language what the primitives can do.

Finally, some Logo screen images that students have created are put on 9x12 tagboard and displayed. This is one way for students to share ideas.

Selected peer helpers are an invaluable source of help. Peer "helpers of the day" should have mastered key concepts and be able to communicate well.

A Logo procedure TO HELP can be entered in the computer and changed to fit the current Logo assignment. When the student types HELP, the text-screen will print directions or explanations without losing the current screen image. (A sample help procedure is listed at the end of this article.)

HOW CAN I KEEP TRACK OF WHAT MY STUDENTS ARE DOING WITH LOGO?

Students need not keep written journals. Handwriting for young children is laborious and is a skill practiced in other learning areas. Students can be taught at the beginning to use diskettes to save and access their work. Their work is then readily available for the teacher to review whenever convenient. The teacher can also send special messages to the student. Paxson students know that they have a message from the teacher when they see a procedure entitled TEACHER in their file. By typing the procedure name TEACHER, the message appears on the screen. (See sample at the end of article.)

ARE RULES NEEDED FOR THE COMPUTER ENVIRONMENT?

A Logo environment provides an excellent arena for students to practice the self-direction that is needed as they become older and assume increased control over their daily lives. Students can exercise responsibility and develop a strong, positive self-image when their teacher encourages cooperation and sharing, has realistic expectations of each student, and allows students to set their own goals.

Since grading and testing are not integral parts of learning Logo, students are free to share and to use each other as resources. As an opening part of our Logo sessions at Paxson, students are given the opportunity to share their discoveries and problems. Such student interaction solves many problems and promotes skill in communication and self-guidance. Teacher participation in these conversations is usually needed only to clarify unknown primitives or provide detailed explanations of concepts that are unclear. Because there is no grading, the Logo experience is not a harsh, competitive activity, and students are eager to share and assist each other in problem solving.

Sharing diskettes introduces the idea of personal ownership of computer work and respect for the rights and property of others. Establishing an ethical code on the accessing of computer records should begin early in a student's computer experience.

```
TO HELP
 CLEARTEXT TEXTSCREEN
 PRINT [DO YOU NEED HELP WITH:]
 PRINT [ ]
 PRINT [THIS WEEK'S ACTIVITY?]
 PRINT [.....PRESS "1"]
 PRINT [ ]
 PRINT [THE NEW PRIMITIVE?]
 PRINT [.....PRESS "2"]
 PRINT [ ]
 PRINT [OR PRESS "Q" TO QUIT.]
 MAKE "Q RC
 IF :Q = "1 PG1 STOP
 IF :Q = "2 PG2 STOP
 IF :Q = "Q CLEARTEXT STOP
 CURSOR 10 15
 PRINT [FLEASE USE 1, 2 OR Q]
 PRINT [.......PRESS FETURN AND TRY AGAIN.]
 MAKE "Q RC
 HELP
END
```

```
TO TEACHER
 PRINT [YOUR PICTURE IS SPECIAL! I THINK IT]
 PRINT [ ] PRINT [WOULD MAKE A GOOD SCREEN STORY. IF]
 PRINT [ ] PRINT [YOU ARE INTERESTED IN WRITING SOME]
 PRINT [ ] PRINT [PARAGRAPHS TO GO WITH IT, I'LL SHOW]
 PRINT [ ] PRINT [YOU HOW TO MAKE IT INTO A COMPUTER]
 PRINT [ ] PRINT ["BOOK". SEE ME AT LUNCH IF YOU WANT]
 PRINT [ ] PRINT [TO TALK ABOUT IT.]
END
```

END■

[Shirley Torgerson, Paxson Elementary School, South Higgins and Evan Ave., Missoula, MT 59801.]

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[1] Phillips, Wayne R. "How to Manage Effectively with Twenty-five Students and One Computer." *The Computing Teacher,* March 1983, p. 32.

[2] Bloom, Benjamin S. *Stability and Change in Human Characteristics.* NY: John Wiley & Sons, 1964, p. 237.

Teaching BASIC

BASIC is the second computer language students are introduced to in this curriculum. BASIC is the second language because it is more abstract than Logo and it is not suitable for young children.

The instruction of these languages is not considered to be the beginning of 'career training' instruction but rather it is important that students have a good sense of what programming languages are and how they work. The skills we wish the students to retain are the analytical and synthetical skills that are developed and used while learning to program. These skills, it is hoped, will be transferred to more general situations and can help students reach a more mature style of thinking and working. We are teaching programming as a means of solving problems, chunking ideas, organizing the pieces and coming up with a working whole... after all the debugging of course. The teaching of BASIC is secondary.

In addition to the activities suggested in "Elementary Computer Literacy" a Discrete Teaching Unit which is included in this package, there are numerous texts that offer novices instruction in the BASIC language. I highly recommend the following texts to teachers organizing the introduction of BASIC to their students.

Kid's and The Apple
Edward H. Carlson
Reston Publishing Company, Inc.
1982

and

An Apple For The Teacher
George Culp and Herbert Nickles
Brooks/Cole Publishing Company
1983

Don't get 'stuck' in the programming section. It is far preferable to spend any extra computer time using an application program such as a word processing or data base program.

Word Processing

There is no better way to introduce adults to the joys of computing than through Word Processing. Word Processing frees writers to think, compose, record, organize and revise their thoughts with ease. Gone forever are the days of correcting tape, white-out, and baskets piled high with scrunched balls of paper. Gone forever are the tears of frustration when a single error meant hours of work retyping pages and pages and pages... (Except of course when a power outage strikes and you haven't been saving your work or when you've got 32 pages of text and your program crashes into never-never land... thank goodness these minor frustrations don't happen often!!)

Your students are more likely to need to know how to word process than any other computer related activity. Males and females alike will need to know how a word processing program works. It matters little which program is used as long as it can provide a friendly introduction to word processing. If possible, students should have the opportunity to learn how to use more than one program. The experience will assist him/her to generalize and feel more confident about tackling any word processing program.

Many offices have dedicated word processors. This means that the machine cannot do anything else. You could not load in your favorite adventure game and relax for a while. Our schools tend to have computers that can 'become' word processors if the proper software is loaded into memory. Our computers can, through the talents of skilled programmers, 'become' or simulate a variety of different machines. Once a word processing program is loaded into memory then the computer responds to the commands that are a part of that particular program. While many programs have similiar commands, the commands are not usually transferrable from one program to another. This means that you must read your manual or better yet, get someone to show you how it works and what the basic commands are. Discourage your 'teacher' from showing you too much of the 'fancy stuff'. It can be mind boggling.

Students enjoy the freedom of word processing also. Initially the magic seems to evolve from the wonderful clean and professional copy that is produced. Later, they begin to appreciate the ease at which editing can take place. The attitude towards debugging needs to be nourished when it comes to student's creative written products. It's an attitude that must be nourished carefully throughout all classroom writing and the Language Arts in general. Students become frustrated from the lack of keyboarding skills once they begin to write lengthier products. For this reason you should seriously consider starting any word processing unit with keyboarding instruction.

If you're working with younger students whose writing features a lot of invented spellings, don't be concerned. Just because the product looks `published' we sometimes feel that it must appear to be completely error-free. Young students will be proud of their products because they worked hard to produce them. The spelling can be a focus of instruction at a more suitable time. One of the better programs I've used with young non-readers is **Applewriter II**. This program has a clear screen without a lot of written instructions. It is possible to introduce the students to the instructions they need to know about and let them get on with the writing. You can have rebus-style instruction charts handy and they can get along quite independently.

One word of caution prior to introducing the objectives. When you begin your word processing unit give the students time to get adjusted to the keyboard and the program. Even though they know it's the same keyboard, it seems different. The keys do different things, Give them time to adjust to the changes. Unless you give them this time to `play' your first few assisgnments will be less successful than hoped because they'll be `playing' and getting used to the equipment. It's a reasonable need on their part. Please plan some playtime into your word processing schedule.

Objectives:

☐The student should be able to outline the purpose of word processing

☐The student is able to contrast and compare writing using a word processor, writing using paper and pencil, and writing using a typewriter

☐The student is able to use the basic commands featured in a child-sized word processing program or a limited portion of an adult-sized program

☐The student is able to use a word processor for teacher-directed and activities which include the following skills:
*creat new files
*input compositions
*edit a file
*name and save a composition
*print documents

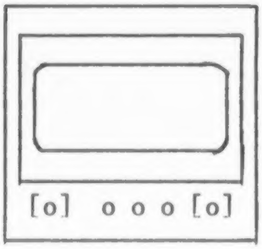
☐The student is able to discribe one or more ways word processing is used in different fields

☐The student is able to recognize the products of word processors in the home and work place

The following is a unit prepared for the Saanich Computer Curriculum committee by Dr. Betty Collis and adapted for our use. It is included to give you an idea of the types of lessons you can prepare for your students that can be tailor-made to fit your curriculum and their needs. Don't forget that word processing is great for creative writing as well!

Word Processing

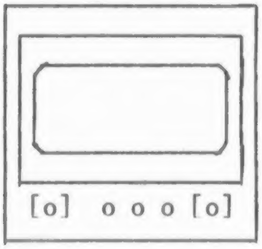
LOADING AND EDITING A FILE



Computer Literacy Objectives

- Use a prepared program on a computer.
- Identify and use letters and numbers on a keyboard.
- Identify and use common special purpose key.
- Use a computer as a word processor.
- Edit a word processing file for spelling, punctuation and creative writing.

The student will use a word processing program, LOAD an assignment (FILE) already saved on a disk, EDIT (or make changes or additions) to the file, and SAVE his or her work as a new file on the data disk.



Teacher Preparation:

Obtain	Apple microcomputer and disk drive. Monitor Printer. Word Processing software (Bank Street Writer and Milliken Word Processing are recommended)
Practice	Using the selected word processor and printer.
Prepare	Three student worksheets. A data disk for the class with the activities reproduced.

LOADING AND EDITING A FILE

Teacher's Notes:

These files should saved as TIME CAP U.F.O. and Once Upon A Time on a data disk.

TIME CAP

This is 1985. We are selecting items for a Time Capsule. Add one item to the list. The Time Capsule will be opened in 2085:

1. A traditionally dressed doll.
2. A book of jokes or funny tales.
3. A collection of tales told by elders.

U.F.O.

Replace each ** with a word and save your story on the class disk.

Late one afternoon, I was **ing through **. I crossed the ** and entered the **. Twilight had come, and it was very ** there. All at once, I heard **. I looked up and there was a ** coming straight down. It landed with a **. I was **! "I'm **!," I thought.

I ** closer. I tried to touch the ** with my **, but my ** bounced off a ** that surrounded the UFO. Then ** opened in its side. A ** was lowered. Out came a **. It has a ** like that of a **. In two of its hands it carried something that looked like a **. I think it took my **. Then the ** was taken up again, There was a ** and the UFO shot up **. Then it changed course and hovered over **. Suddenly it was gone! On the ground where it had been was a **. I ** home and told my family about the **. They said, "You've been reading too many **!" But I decided to report the UFO to the **.

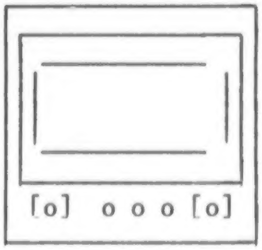
Moral: Don't go ** in **, or you may have your ** taken by a ** from **.

Once Upon A Time

Once Upon A Time I was walking down the hall to the principal office when...

Once Upon A Time I was heading out across the land when...

LOADING AND EDITING A FILE



Lesson Ideas:

1. Show the class how to boot the word processor program of your choice and how to load (GET or RETRIEVE) the file TIME CAP.

2. Demonstrate movement of the cursor, how to delete a letter or a word, and how to add or insert letters or words. Give everyone a chance to practice editing.

3. Give each student a chance to use worksheet and save to disk his or her responses to the TIME CAP program. Make sure each child saves his word with a name other than TIME CAP - leave TIME CAP as it is on disk so that each student will load the same assignment. Ask the children to save their files using their initials. If more than one have the same initials have one of them choose a different identifier. (If the Milliken software is used, the entire file name cannot exceed 8 characters.)

4. Print each child's file. After all have been edited and final copies printed, make a class display of the TIME CAPSULE print outs.

5. Repeat steps 3 and 4, using the file U.F.O. For this exercise, the students must replace each ** with an appropriate word.

6. Repeat steps 3 and 4 using the file Once Upon A Time. For this exercise the students must load the file, read the story segment and continue the story by adding another segment. They must save under the same name so only the most recent version will be kept.

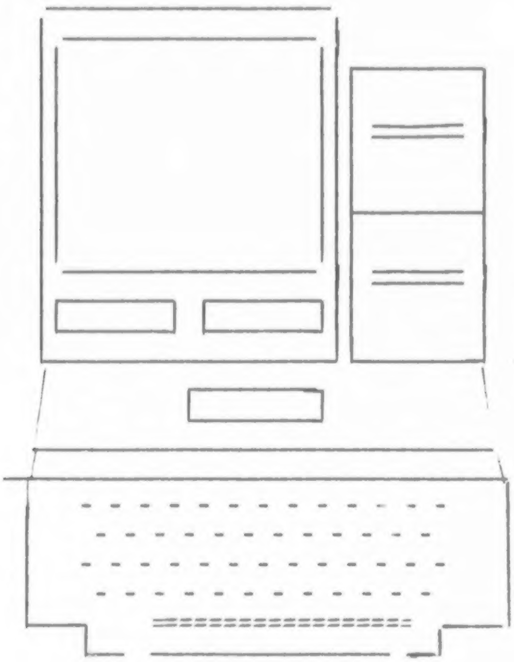
LOADING AND EDITING A FILE

NAME: ____________________

Use a WORD PROCESSING program to load a copy of an assignment your teacher has already typed (INPUT), add some sentences to it (more INPUT), save your sentences and the copy of your teacher's program on the class disk (as OUTPUT) and make a printed copy of your work (MORE OUTPUT) if a printer is attached to your microcomputer.

COMPUTER INPUT...

- Copy of file on disk
- Typing from the keyboard



COMPUTER OUTPUT

- New file on disk
- Print-out

1. Get the file named TIME CAP. Add 4 more things that you think would be good to save in a Time Capsule. Save your file (or put your file away on a disk) by naming it with your initials and the word TIME (for example, BC TIME). Your teacher will help you use the printer so you can see your work on paper. Do you want to change anything. Load your file, edit it, and save it again!

2. Now load the file UFO. You will see a story with ** where words should be. Replace each ** with a word. For example,

Late one afternoon, I was ** through **.

could become:

Late one afternoon, I was running through the park.

OR

Late one afternoon, I was sneaking through the mission control centre.

Use your imagination!

Save your story. Use your initials and UFO (for example BC UFO).

Print a copy. Do you want to edit?

When you have printed your final copy, add it to the class collection.

3. Now load the file. "Once upon a time..." You will see the beginning of a story. It is up to you to write the next story segment. When you have finished, save it under the same name as the old version will be replaced with your new version. Your classmates will continue the story later.

Keyboarding

The more computer time your students have the more they will require some touch typing skills. Once they begin to enter volumes of information the lack of touch typing skills results in frustration, incomplete work and little or no time for revision and editing. Students begin to become very frustrated in spite of their incredible motivation to learn everything there is to learn about computers and use them as much as possible.

Computers made their way into the elementary schools only to be followed by teams of researchers. Some of the researchers have been interested in watching the way students interact with computers and how well they manage to interface through the keyboard. Others have set out to see what differences keyboarding instruction can have. The results are showing that with a little as eight hours instruction students can manage to type up to15 words a minute with accuracy. A figure some claim to be an adequate goal in view of the fact that educators can't be expected to make much more room in their already filled timetables. It's recommended that keyboarding instruction be begun as soon as possible but no later than a year before students will be expected to produce reports and other written work on the computer.

Up until recently there wasn't a very good selection of software to assist teachers who wished to teach some keyboarding skills to their students. **Mastertype**, a arcade-style game, tended to reduce students to arcade-style behavior and leave many adults cringing in their seats while their ship was blown up by the faceless enemy. **Typing Tutor** meanwhile was suited for more mature audiences than the typical primary or elementary student. But now programs such as **MicroType** and **SuperKey** have begun to appear.

While both programs are excellent, I purchased Superkey because it didn't require the disk to remain in the disk drive. This seems to result in faster responses to student work. While intended for use by students in Grade 3 and up, Superkey would be suitable for younger students with supervision. It has excellent graphics and a simple but well written manual. It is possible to add your own text and to practice using your written materials. The manual includes a record sheet and some hints as to how to correct some common typing errors.

If you do not have access to such a program don't dispair. There are alternatives. On the next few pages there is an article by Lorraine Hopping called, **"Say Goodbye To Hunt-and-Peck"**. It was originally printed in the February, 1984 edition of Teaching and Computers.

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Say Goodbye to Hunt-and-Peck

Now there's an easy way to teach touch typing!
Just follow this three-step process.

by Lorraine Hopping

Hunt-and-Peck isn't a comedy team — it's a slow and tedious method of typing that many of your students use when they operate computers. Unfortunately, this method demands a great deal of time and energy that could be spent on more important computer activity.

Children can be taught to move their fingers across the keyboard with ease and relative speed through a process known as touch typing. Although primary grade children do not have the fine motor skills needed to completely master touch typing, they can learn to locate the keys easily by following the basics of this process. Second and third graders can pick up a little speed through the fingering techniques. And with practice, fourth through sixth graders actually can average 25 to 30 words per minute.

The following three-step process will provide you with *key* strategies for teaching touch typing. In the first step, students will locate keys and learn proper fingering on a paper keyboard. Next, they'll practice the proper fingering on typewriters or computers, using exercises written on three-dimensional typing cards, known as typing triangles. Finally, students will pick up typing speed, by playing commercial typing games.

Step One:

Learn proper fingering on paper keyboards.

Materials: One copy per student of the paper keyboard; red, green, yellow, blue, purple, and black felt-tip pens; two pieces of poster board; rolls of red, green, yellow, and blue tape (optional).

Activity: A good way to introduce children to the computer keyboard is through paper replicas. This way every child gets his or her own keyboard, and kids will be able to concentrate on fingering without being distracted by the "feel" of the keys.

Begin by giving each student a photocopy of the paper keyboard that is on the previous page. (Computer keyboards vary from model to model. If the computer keyboards in your school differ from this paper keyboard, be sure to pencil in the necessary adjustments before photocopying.)

Ask children to locate the computer's special function keys on their paper keyboards. Call out the names of these keys, one at a time, and tell students to color the keys purple. Special keys differ from machine brand to machine brand, but they probably will include: ESC, CONTROL, DELETE, RESET, RETURN or ENTER, SPACE BAR, and TAB.

Using small pieces of colored tape or felt-tip pens, help students cover the fingernails of both their hands with these colors: red for the first (index) fingers, green for the second, blue for the third, and yellow for the fourth fingernails.

To remind students which color goes on which fingernail, make a pair of hands out of poster board. The fingernails of each hand should be red, green, blue, and yellow, consecutively. (Leave thumbs plain.)

Post the hands and an enlarged copy of the original, colored paper keyboard on a wall. Have students color the keys on their keyboards the same colors as those on the display keyboard.

Show students how to place their fingers on the middle row of keys (*home row*): left, yellow finger on the left, yellow key; right, yellow finger on the right, yellow key; left, green finger on left, green key, and so on. Red fingers go on the red keys farthest from the center of the row (where "J" and "F" would be).

Call out commands like "right hand, blue" and have students practice "pressing" the key with the appropriate finger (Make sure kids don't peek at the keys as they do this drill.) If they forget which key or finger to use, tell students to look at the paper keyboard on the wall, not at their own keyboards.

Show students how to use their first fingers to press the two center keys on the home row. Designate these keys "left, red two" and "right, red two." Continue to call out key locations at a steady rhythm for five to 10 minutes.

The next day, introduce the row of keys positioned directly above home row. Once again, have students match up fingernail colors with key colors. Just as on the home row, the keys in the center are "left, red two" and "right, red two."

For five to 10 minutes, call out different combinations of keys, such as "home row, green; top row, blue," and so on. Students must "press" the correct left- and right-hand keys without looking.

Repeat this exercise with the bottom row and the very top row in subsequent lessons.

After a week or so, introduce the letters of the keyboard, one at a time, starting with the home row. For each key, have students fill in the letter using a black felt-tip pen. After each row of keys is labeled, drill students for a few minutes by calling out letters for students to press.

When all the colors and letters are filled in, laminate the keyboards. Students now have a personal keyboard to use for reference and practice.

Extension: On the chalkboard, write letters, words, and sentences for students to type on their paper keyboards. Remind students not to peek at the keys as they type.

Have students make up lists of words that use only the home row, only the top letter row, or only the bottom row of keys. Display these words for students to practice typing.

Step Two:

Use typing triangles for drill and practice on typewriters and computers.

After two or three weeks of using paper keyboards, students will be ready to get the "feel" of a real keyboard. Although computer keyboards are preferable, if either hardware or word processing software is scarce, electric typewriters will do. Manual typewriters, on the other hand, generally prove too difficult for small fingers to manipulate.

To keep students from peeking at the keyboard, post sample copies of students' paper keyboards on the wall above each typewriter or computer. That way, if students forget the location of a key, they can look up instead of down.

Students should already be familiar with key locations and finger placement. All you need to do is introduce the use of the space bar and carriage return (RETURN or ENTER key).

Drill students as a class for five or 10 minutes on these concepts by calling out individual letters, "spaces," and "returns," and asking students to type them.

Now divide students into pairs, and give each pair the first typing triangle. It contains letters and words that use the home row keys. One student in each pair calls out the letters and words on the triangle, while the other types them. (The caller also checks for peeking.) After approximately 15 minutes, have partners switch places.

Hand out the other three triangles (one for the top row of letters, one for the bottom row, and one for the very top row of keys) on consecutive days.

Extension: As students become proficient on the typing triangles, have students make up their own triangles, using words on a spelling or vocubulary list. They can trade triangles and challenge each other with harder and harder triangles.

Some teachers recommend having students type to music. Popular music that has a steady beat and medium tempo works best.

You may wish to set up weekly typing contests in which students type all the letters on a triangle as fast as they can. Each week, post the winning results — those papers completed in the least amount of time, with the fewest mistakes — on a bulletin board labeled "Typing Aces."

Step Three:

Use commercial software to improve students' typing speeds.

Materials: Commercial typing software; computer.

Activity: After drilling on the typing triangles for a few weeks, finger placement should be second nature to students. Now they are ready to work on typing speed. Commercial typing programs are excellent tools for this.

There are generally two kinds of typing programs: (1) tutorial and (2) drill and practice. Both types encourage quick and accurate typing.

Even though tutorial programs are supposed to provide basic instruction, most require teacher supervision if students have not been previously introduced to finger placement. Any student who has completed steps one and two of this typing program probably can work independently on them, however.

Of the drill and practice programs, many are arcade-type games. For example, in programs like *Type Attack* and *MasterType*, students must type letters quickly to avoid being bombarded. The faster they type the letters, the better the score.

Some teachers find that when using these game programs, many students become involved in winning the game and revert to hunt-and-peck to type faster. To make sure students do the drills properly, some teachers require that students be more proficient at touch typing than at hunting-and-pecking before using the software. They do this by requiring the students to type 15 to 20 words per minute before allowing them to play the games. Such speed goals also provide an incentive for students to practice harder on the typing triangles.

Many teachers recommend using a combination of tutorial and drill and practice programs for typing practice. Tutorials reinforce good instruction, while the drill and practice games boost enthusiasm for typing.

MasterType

Description: This is one of the most popular typing games. Students fend off enemy words by typing them in. Seventeen lessons cover letters, words, and punctuation marks. Teachers create the eighteenth lesson themselves.

Hardware: Apple II Plus, IIe (48K); Atari 400, 800, 1200 (cartridge and disk); Commodore 64 (cartridge and disk); IBM PC.
Price: $39.95; IBM version is $49.95.
Contact: Scarborough Systems, 25 North Broadway, Tarrytown, NY 10591.

Microcomputer Keyboarding (four disks)
Alphabetic Keyboarding (two disks)

Description: Designed as a comprehensive typing package for all skill levels. *Microcomputer Keyboarding* contains a thirty-lesson tutorial and drill and practice program on four disks. It can check for speed, accuracy, or both. *Alphabetic Keyboarding* (two disks) provides an introduction to the letters, numbers, and symbols on the keyboard.

Hardware: Apple II Plus, IIe (32K) and Apple Corvus Network; TRS-80 Models III and 4 (48K) and TRS-80 Network III; IBM PC (64K).
Price:*Microcomputer Keyboarding* (four disks) is $200 for single computer versions, $795 for Apple Corvus Network, and $750 for Network III; *Alphabetic Keyboarding* (two disks) is $89.50 for single computer versions.
Contact: South-Western Publishing, 5101 Madison Rd., Cincinnati, OH 45227.

Microtyping II

Description: Provides tutorial as well as drill and practice exercises. Students type sentences and save them on disks. The program records speed and errors. For elementary students and above.

Hardware: Apple II Plus, IIe (48K); Atari 400, 800 (48K).
Price: $29.95.
Contact: Hayden Software Co., 600 Suffolk St., Lowell, MA 01853.

Type Attack

Description: In this drill and practice program, letters and words descend in "attack waves;" students must type the letters or words before they reach the bottom of the screen. Players can control speed. Appropriate for all ages.

Hardware: Apple II, II Plus, IIe (48K); Atari 400, 800, 1200 (48K); Commodore 64; IBM PC; VIC-20 (no additional memory required).
Price: $39.95.
Contact: Sirius Software, 10364 Rockingham Dr., Sacramento, CA 95827.

Typing Tutor

Description: This program provides tutorial as well as drill exercises. Students choose keys they wish to work on. Teachers can monitor up to 49 students. The program measures speed and accuracy, and creates individualized drills to focus on each student's weaknesses. Has only upper case letters.

Hardware: Apple II Plus (48K), IIe (64K).
Price: $24.95.
Contact: Microsoft Consumer Products, 400 108th Ave. NE, Bellevue, WA 98004.

Lorraine Hopping is assistant editor for *Teaching and Computers*. Educators who contributed ideas to this article are **Thomas Boudrot,** coordinator of computer instruction, Alief, Texas; **Beth Deardorff,** sixth grade teacher, Orono, Miane; **Meredith Richards,** researcher, Charlottesville, Virginia; **Brenda Lloyd** and **Janet Posner,** elementary school teachers, Charlottesville, Virginia; **Mary Ellen Switzer**, typing structor, Del Mar, California; and **Bryna Watkins,** typing club instructor, Bedford, New York.

Typing Triangle 1

CUT OUT AND REPRODUCE

Typing Triangle #1

asdf jkl; asdf jkl; asdf jkl; 1

as df jk l; as df jk l;
(fold here)

fgf jhj fgf jhj fgf jhj 2

sad dad fad gad had lad
(fold here)

A lass has a dad 3

Al has a glad lad as a dad
(fold here)

PASTE HERE

Directions: To make a typing triangle, cut out pattern and fold paper on dotted lines, with type facing out. Paste edges together. You'll have a three-dimensional triangle. Permission granted to reproduce this worksheet for classroom use. Copyright © 1984 by Scholastic Inc.

Typing Triangle 2

Typing Triangle #2

frf dad sws aqa juj kik lol ;p; 1

ftf jyj gtg hyh ftf jyj gtg hyh
(fold here)

Derek has a treat at the house 2

Lulu gets a dollar as a gift
(fold here)

You had a good plaid dress 3

It is always as good as gold
(fold here)

PASTE HERE

Typing Triangle 3

Typing Triangle #3

fvf dcd sxs aza jmj k,k l.l ;/; 1

fvf fbf jmj jnj gbg hnh

(fold here)

I can type without looking. 2

What is new at the zoo with you?

(fold here)

The quick brown fox jumped over 3

the lazy, good for nothing, dog.

(fold here)

PASTE HERE

Typing Triangle 4

Typing Triangle #4

1234 5678 90 123 234 456 789 1

12 23 34 45 56 67 78 89 90

(fold here)

$10 25¢ 32% #78 (90) 5&10 2

@91 100%! *54* -20- $89.24 4'3"

(fold here)

$39 buys 4 3x5" cards and 10 pens 3

87%x 26 = $22.62 @ 9% interest

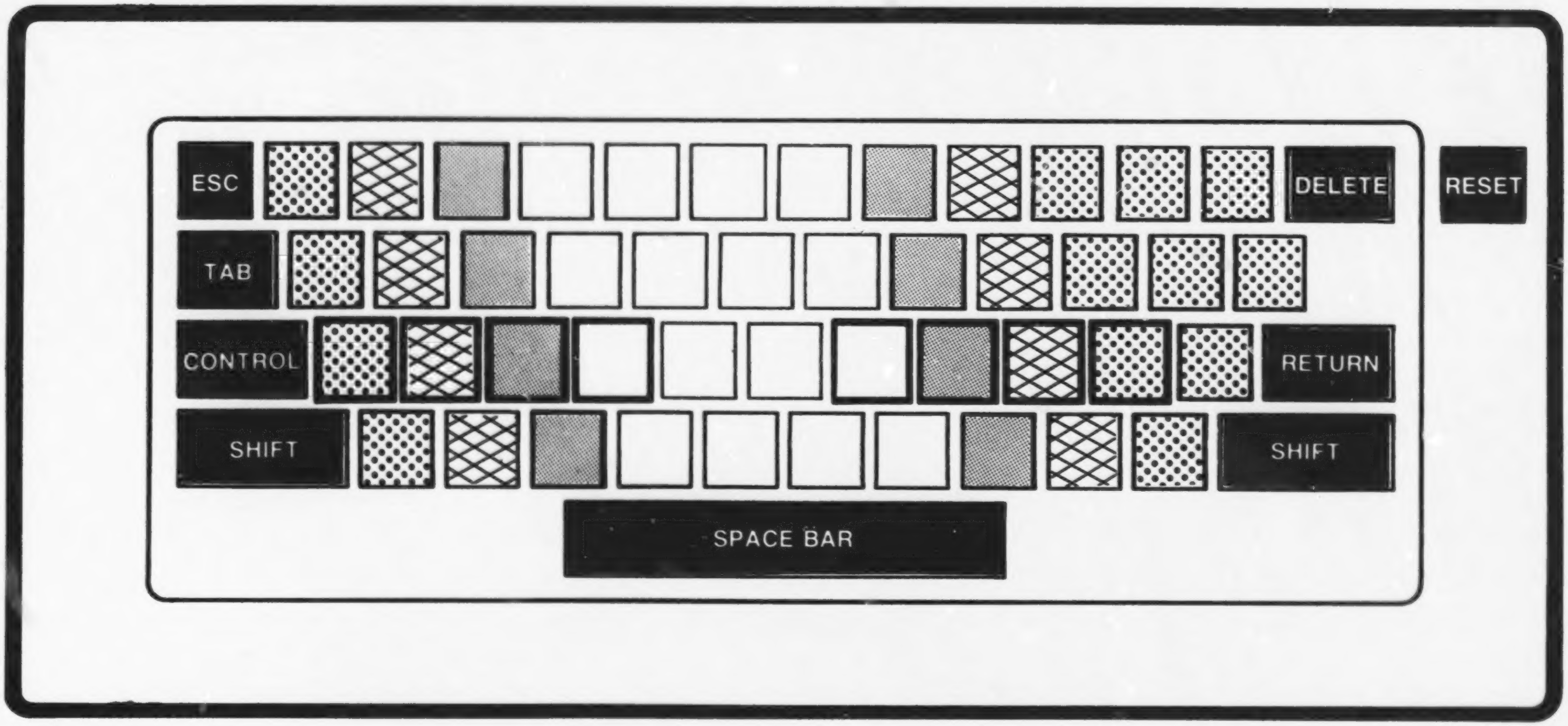
(fold here)

PASTE HERE

Directions: To make a typing triangle, cut out pattern and fold paper on dotted lines, with type facing out. Paste edges together. You'll have a three-dimensional triangle. Permission granted to reproduce this worksheet for classroom use. Copyright © 1984 by Scholastic Inc.

Computer Keyboard

NAME ______________________


ESC
DELETE
RESET
TAB
CONTROL
RETURN
SHIFT
SHIFT
SPACE BAR

KEY

■ purple
▒ green
▩ blue
▦ yellow
□ red

CUT OUT AND REPRODUCE

Using A Data Base

A data base is an organized collection of facts in computer-readable form. Data bases can be big or small, complicated or very simple. Data bases provide access to vast amounts of information that would be too bulky or too expensive to purchase and store. They are a boon to those of us who do not have access to a library or to updated sources of information and research. Data bases are continually updated so the information you `tap' into is the latest and most complete. Electronic data bases have revolutionized our ability to store and use information.

There are many generalized data bases available which permit you access to all sorts of information. You can book your travel arrangements or order exotic products. The information you have available will depend on the data base to which you subscribe. You must shop around and speak with others in the territories who are already `hooked into' a data base. Two of the most popular data bases are THE SOURCE and COMPUSERVE. In order to access a data base you need a computer, a modem and an operating telephone. A printer is almost essential should you wish a `hard copy' of the information you receive.

Data bases will become increasingly important in our lives as technology looms larger and we need immediate access to accurate and constantly updated information. You and your students will soon be creating data bases in your homes and schools to keep better track of your teaching resources and your classroom and school resources. Creating a data bases for software and computer books and magazines is a valuable undertaking. Soon school libraries will follow the public library systems lead and transfer over to a computerized system which will involve the use of a specially designed data base. Such a data base will make it easier to access resources and borrow from other school libraries. Data bases, if kept up to date and if well organized can save time.

The creation of a data base uses and develops skills in classification and research. These skills are a part of the curriculum at all grade levels and while practiced and taught currently, these skills receive real exercise when used to create and then use a data base. Children should begin with information they know well and then proceed to information they know less well. Early experiences should involve students as part of a group (whole class initially) and later, when skills are more finely tuned, students can work in pairs and later as individuals. Classroom data bases can be developed on a variety of subjects that are topics within our Science and Social Studies curricula. Don't stop there though as every subject area holds many possibilities for classifying.

Good topics to begin with are students names and telephone numbers/ favorite foods/ favorite sports/ favorite books/ favorite subjects. As they gain experience you can tie it to research skill development and have them track down, in pairs or small groups, the information required to form a data base about spiders, northern animals, fish, birds, ducks or ???. The list is endless. Be sure to use your students' interests to shape your choice of subjects. Then the unit will be much more likely to be successful.

There are several data base programs available. The selection depends on your needs and your preferences. Many people use **PFS File.** It is simple and yet functional for a variety of needs. It does not require two disk drives. It was also one of the first data bases available. There are others now which were designed for children to use.

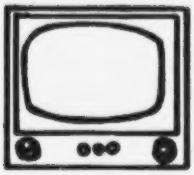
Objectives for Data Base Section:

- ☐understand and be able to state the characteristics of a data base
- ☐use a prepared data base to retrieve information to answer specific questions
- ☐expand an existing data base
- ☐use an existing data base to:
    - -select categories of information
    - -sort and report on specific details
- ☐print a report from a data base
- ☐create a data base (class activity)
    - -select topic'
    - -design form around `research/inquiry questions)
    - -research data
    - -input information
- ☐use data base to answer questions
- ☐use data base to select categories of information
- ☐use data base to sort and report different types of information

An excellent data base unit is contained in the February, 1985 issue of Teaching and Computers. The article, "Dinosaur Data Base" outlines activities suitable for elementary school use.

The following pages contain a sample data base unit, "Animals In A Data Base", prepared by Dr. Betty Collis for the Saanich Computer Project. It is reprinted with permission for your use. Contact your Resource Center for a copy of the disk, **MBCC CLASSIFICATION** to use in conjunction with this unit.

ANIMALS IN A DATA BASE



COMPUTER CURRICULUM OBJECTIVES

Use a prepared program on a computer.

Use a data base program.

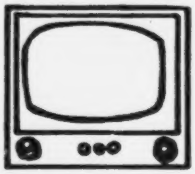
Classification is an important process in science and mathematics. Classification frequently involves organizing and making sense out of large sets of information. DATA BASE MANAGEMENT is the use of a computer in this process of organizing information. In this booklet, the class is involved in an experience of accessing a data base where each record relates to a familiar animal. Words the students should become comfortable with include:

DATA BASE (the entire set of information)

RECORD (an individual "file card" in the set of information)

SEARCH (scan the record of a data base but display only those records with the information wanted)

FIELD (any one of the pieces of information within a record)

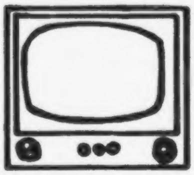


TEACHER PREPARATION:

Obtain →
Apple microcomputer and disk drive.
Monitor.
Printer (desirable).

Prepare → Seven student worksheets.

ANIMALS IN A DATA BASE



TEACHER'S NOTES:

To use the data base program on Classification disk:

1. After the program is booted, choose
   1. DATA MANAGER.

2. On the second menu, choose
   2. Use an existing data base.

3. From the third menu, choose
   1. ANIMAL.

4. From the next menu, with 8 options, experiment with #5 LIST ALL RECORDS AND #3 SORT.

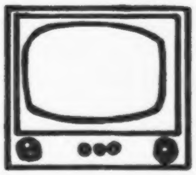
   For sorting, choose any of the indicated fields and then LIST to see how the records have been rearranged. A printer makes this process much more meaningful. For example, sorting on the BODY COVERING field rearranges the records so that all the exoskeletons are displayed first, followed by feathers, hair, scales, and skin.

5. Practise with search For example, to search for all the water animals, choose and Habitat then type in water. Then search for all the names that begin with "m". Type SEARCH, ANIMAL, and then M. Three records should be found.

6. Use REPORT to sort for two different characteristics, such as WATER and SKIN.

   Indicate you would like 3 HEADERS, choose #2, #3 and #4 as column headers (or titles) and select #3 as "the field you want to use to select records." Answer "yes" to do you want to use a second field?" and enter #4. Then answer WATER and SKIN to the next questions.

ANIMALS IN A DATA BASE



TEACHER'S NOTES:

7. Make a two-column report for the animals that have wings and live on land, which will show the names of those animals and their covering.

   To generate this report follow the steps given below.

   a. When asked, "HOW MANY HEADERS DO YOU WANT IN YOUR REPORT?"
   ENTER: 2

   b. When asked to "ENTER THE NUMBER OF THE FIRST HEADER:"
   ENTER: 2 (animal)

   c. "ENTER THE NUMBER OF THE SECOND HEADER:"
   ENTER: 4 (covering)

   d. When asked, "WHICH FIELD DO YOU WANT TO USE TO SELECT RECORDS?"
   ENTER: 6 (wings)

   e. When asked, "DO YOU WANT TO USE A SECOND FIELD?"
   ENTER: YES

   f. When asked, "WHAT IS THE SECOND FIELD?"
   ENTER: 3 (habitat)

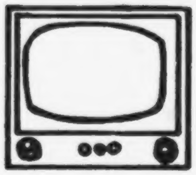
   g. When asked to "ENTER THE WINGS YOU WANT TO SELECT RECORDS FOR"
   ENTER: YES

   h. When asked to "ENTER THE HABITAT YOU WANT TO SELECT RECORDS FOR"
   ENTER: LAND

8. To enter new records, use the existing data base ZOO. Select from the same categories as were used in ANIMALS:

HABITAT	BODY COVERING	NUMBER OF LEGS	WINGS
LAND	EXOSKELETON	0	YES
WATER	FEATHERS	2	NO
BOTH	HAIR	4	
	SCALES		
	SKIN		

ANIMALS IN A DATA BASE



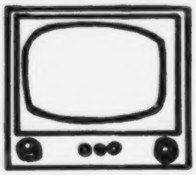
TEACHER'S NOTES:

An Animal Database

ANIMAL	HABITAT	BODY COVERING	NUMBER OF LEGS	WINGS
perch*	water	scales	0	no
owl	land	feathers	2	yes
bat	land	hair	2	yes
cow	land	hair	4	no
cricket	land	exoskeleton	6	yes
fly	land	exoskeleton	6	yes
lamprey	water	skin	0	no
walleye	water	scales	0	no
earthworm	land	skin	0	no
snake	land	scales	0	no
mouse	land	hair	4	no
horse	land	hair	4	no
lizard	land	scales	4	no
toad	land	skin	4	no
rabbit	land	hair	4	no
dog	land	hair	4	no
cat	land	hair	4	no
blue jay	land	feathers	2	yes
squirrel	land	hair	4	no
whale	water	hair	0	no
deer	land	hair	4	no
sparrow	land	feathers	2	yes
monkey	land	hair	4	no
moth	land	exoskeleton	6	yes
alligator	both	scales	4	no
turkey	land	feathers	2	yes
robin	land	feathers	2	yes
frog	both	skin	4	no

***Interpretation:** A perch is an animal which lives in the water. Its body is covered with scales. It does not have either legs or wings.

ANIMALS IN A DATA BASE



LESSON IDEAS

1. Distribute worksheets to the students and have each child cut the sheets so they have sets of 29 animal cards, or **RECORDS**. Describe the entire set as an **ANIMAL DATA BASE**.

2. Ask the children to find various sets of records:

   — The **MOUSE** record.
   — All the records of land animals.
   — All the records of water animals with skin.
   — All the winged animals with more than 2 legs.
   — All the records where the name field begins with "M".

3. Use the **DATA BASE** program on Classification Disk to perform the same searches. Compare the amount of time the computer needed with the amount of time the children required.

4. Give each child an opportunity to use the computer and complete worksheet number 1.

5. Next demonstrate how records can be entered into a data base. The following information could be used:

LION	LAND	HAIR	4	NO

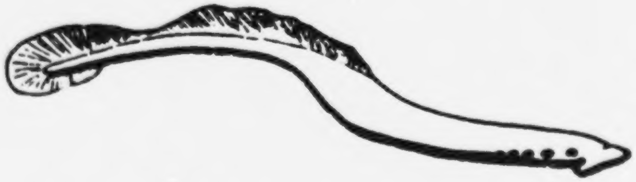
The data base program **ANIMALS** cannot be altered (in order to prevent accidental changes by beginning users). Practise adding records to the existing data base called **ZOO**. Use the same categories as were used in **ANIMALS.**

Assign each child an animal not already in the **ZOO** data base. (Already listed are **BEAR, ELEPHANT** and **MONKEY**). Have them draw the record on the blank card on Worksheet number 2, then enter their new record into the computer.

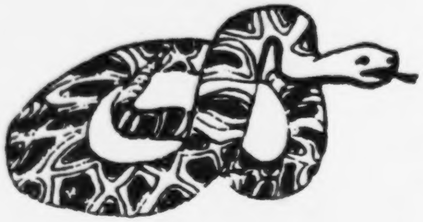
7. When all the new records are entered, repeat the type of questions and activities described in steps 2-4 above.

ANIMALS IN A DATA BASE

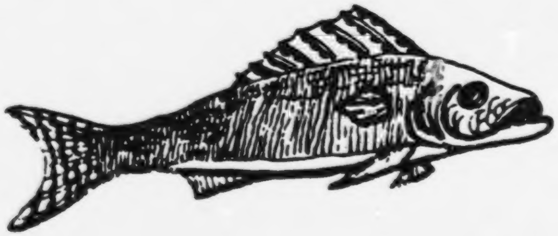
lamprey	water	skin	0	no



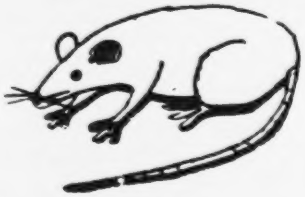
snake	land	scales	0	no



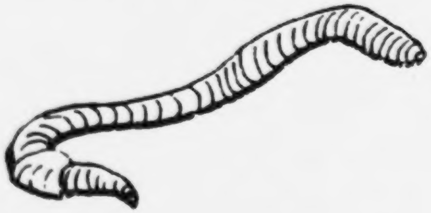
walleye	water	scales	0	no



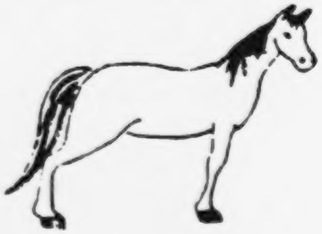
mouse	land	hair	4	no



earthworm	land	skin	0	no

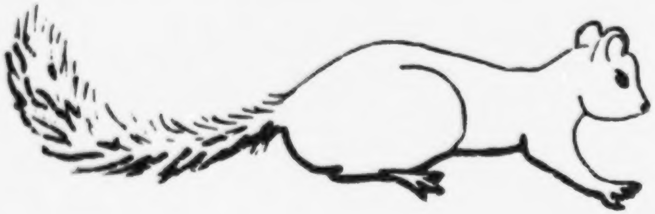


horse	land	hair	4	no

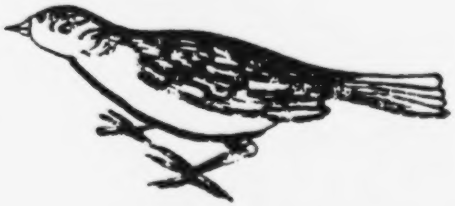


ANIMALS IN A DATA BASE

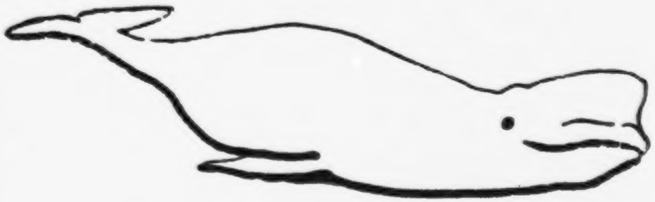
squirrel	land	hair	4	no



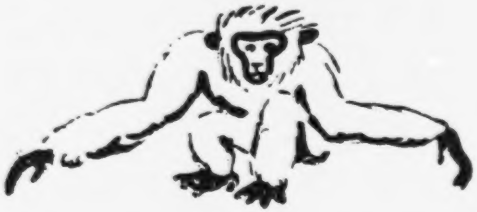
sparrow	land	feathers	2	yes



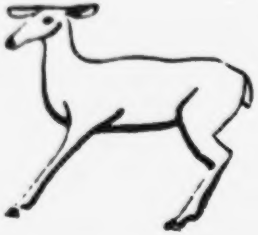
whale	water	hair	0	n0



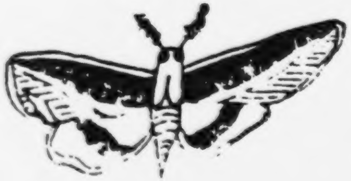
monkey	land	hair	4	no



deer	land	hair	4	no

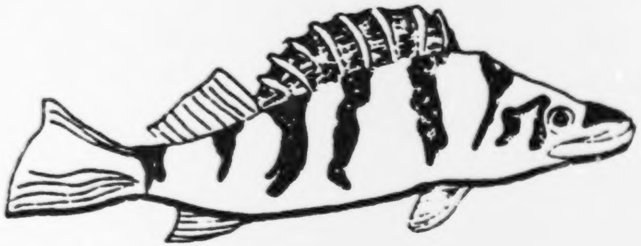


moth	land	exoskeleton	6	yes

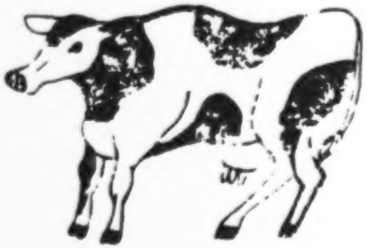


ANIMALS IN A DATA BASE

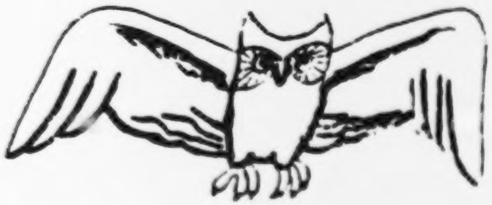
perch	water	scales	0	no



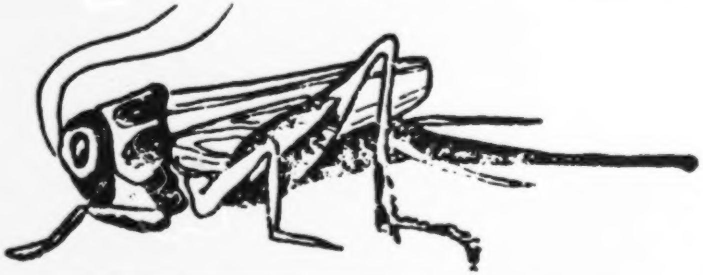
cow	land	hair	4	no



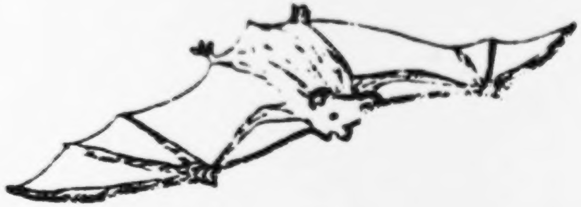
owl	land	feathers	2	yes



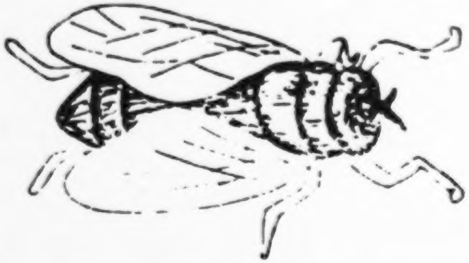
cricket	land	exoskeleton	6	yes



bat	land	hair	2	yes

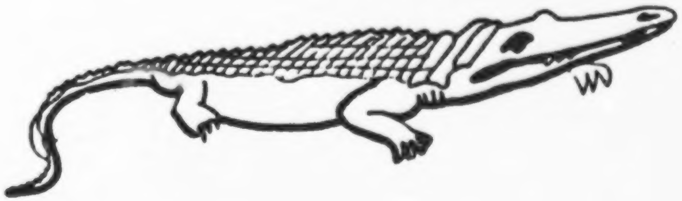


fly	land	exoskeleton	6	yes

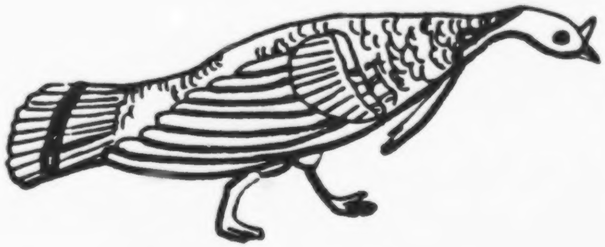


ANIMALS IN A DATA BASE

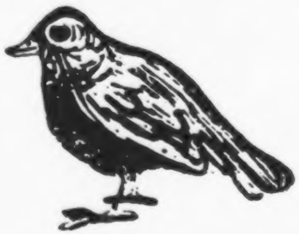
alligator	both	scales	4	no



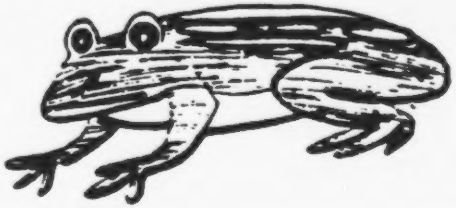
turkey	land	feathers	2	yes



robin	land	feathers	2	yes



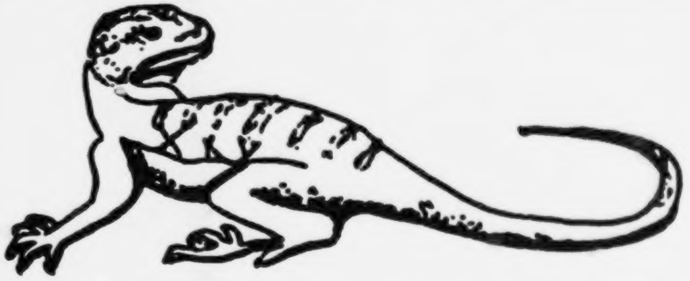
frogs	both	skin	4	no



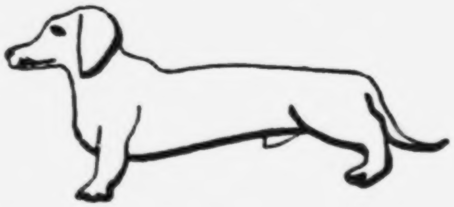
ANIMALS

ANIMALS IN A DATA BASE

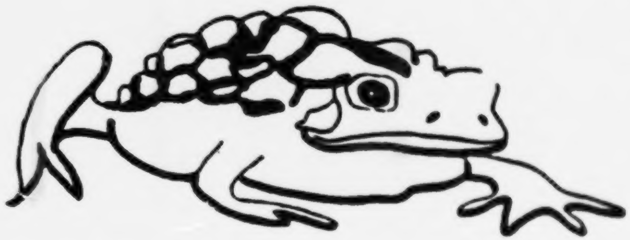
lizard	land	scales	4	no



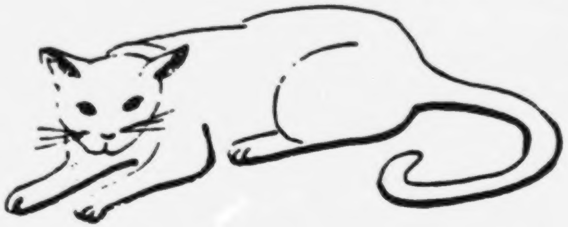
dog	land	hair	4	no



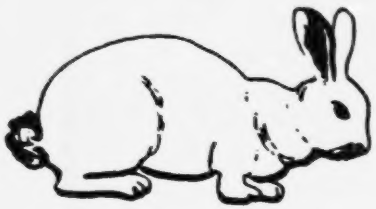
toad	land	skin	4	no



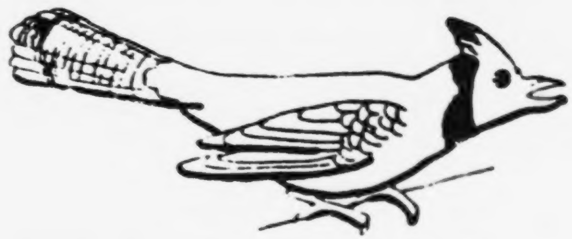
cat	land	hair	4	no



rabbit	land	hair	4	no



blue jay	land	feathers	2	yes



ANIMALS IN A DATA BASE

(Worksheet number 1)

Name: ______________________________

1. Use the data base management program on disk 8B. Choose the existing data base called

   1. ANIMALS. The records in this data base match the records on your set of cards.

2. Use the SORT option to put the names of the animals into alphabetical order.

3. Use the SEARCH option to find how many have 0 legs.
   How many? ________________________

4. Use the SORT option to put the records in alphabetical order of **body coverings**.

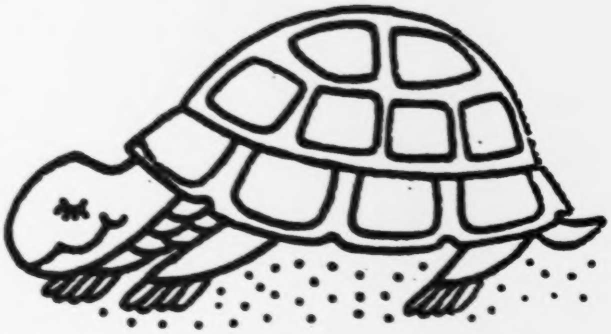
5. Use the REPORT option to find all of the animals that have hair and live in the water. You will need 3 HEADERS; ANIMAL, BODY COVERING and HABITAT.

6. Use the REPORT option to find all the animals that have scales as a body covering and 2 as a number of legs.

   List the animals the program found:

ANIMALS IN A DATA BASE

(Worksheet number 2)



Name: ____________________________

1. Help your class put records into a new data base called ZOO. Use the data base program to get the existing file named ZOO. How many records are in ZOO?

____

Write the names of the animals already in the ZOO data base.

Animals in ZOO data base:

2. Choose a new animal to go into ZOO. Circle the correct information about your animal:

ANIMAL: ____________________________ (name)
HABITAT: LAND WATER BOTH
BODY COVERING: EXOSKELETON FEATHERS HAIR SCALES SKIN
NUMBER OF LEGS: 0 2 4 6
WINGS: YES NO

3. Choose the ENTER option and put this information into the ZOO data base.

4. List the ZOO data base. Do you see your record? ____________________________

Modems and Telecommunications

Modems (pronounced MOE-dums) are devices which convert computer output into a form that can be sent over ordinary telephone lines. In theory using a modem is quite simple. You plug it into a small computer, dial the required telephone number, set your telephone handset on the modem, turn your computer on, and assuming the other person or machine at the other end has done the same, the two machines can interact. Distance is of little concern except when the telephone bills and user fee billing arrives.

There are more and more modems being used to connect students and schools to each other and to Data bases such as CompuServe and The Source. There was a project which allowed students in California and students in rural Alaska to correspond regularly. Other projects have involved classes in one school teaming up with students in another school and sending messages and information to each other. Much of this is done using Electronic Mail. The major information services assign every subscriber with an "electronic mailbox". This is an area of disk storage which has an address. Another subscriber who knows your address can send mail to your mailbox where it waits until you call up and check your mail. This avoids the need to arrange to have the person at the receiving end of your 'mail' having the computer turned on and ready to recieve your message. By using electronic mail both parties can send a message or check their mailboxes when it's most convenient for them. They can also make use of reduced telephone rates. Electronic Bulletin Boards can be established which permit individuals or groups to exchange information within a school district or nationwide.

There are a great variety of software packages available to use with modems and lots of modems available to use. Which are the best for our use is difficult to say without a lot of experimentation. At time of printing, Bill Belsey, Kreterklerk School in Eskimo Point had spent a lot of time 'playing' with modems. You might wish to seek his advice before you purchase a modem for your school.

One of the software packages aimed towards children that encourages the use of the modem is called **The Newsroom**. It is produced by Springboard Software. It allows you to use your modem to send or receive pages, panels, banners or photos that have been created using **The Newsroom**. It will permit students, in concert with a modem, to exchange school or classroom newspapers with students from another school. We might just get a territorial or nation wide system set up!

Electronic Spreadsheets

Electronic spreadsheets provide capabilities normally exercised through the use of a pencil, paper and a calculator. However, spreadsheets speed up the process and provide accurate information quickly and in a variety of formats.

The program displays a screen divided into rows and columns that can represent anything. The intersection of a row and a column is called a "cell". The program remembers everything put into the cells including words, numbers, and formulas for computing information appearing in the cells.

The advantage of electronic spreadsheets, as great assists in problem solving, is well known in the business world. An electronic spreadsheet allows students to sort out complicated problems or gain important information to aid in decision making without becoming bogged down with the computations. It permits and encourages users to play "what if?" games.

Objectives for Spreadsheet Section:

☐understand the purpose of a spreadsheet program
☐use a prepared spreadsheet template to explore how the program operates
    -how to enter data
    -how to change data
    -make predictions
    -write simple formulas
☐as a class project create a template to explore a familiar situation
☐use the program to solve problems in Science, Mathematics, or Social Studies
☐use the program to keep records such as classroom supplies, lunches, daylight hours or prices at the local Bay store.

There are many spreadsheet programs available for use. One program I'm familiar with is **Appleworks**. This program features an integrated word processing, data base, and spreadsheet package that is excellent.

Some instruction has begun with elementary students however most students aren't introduced to spreadsheets until Junior High School. If you're teaching Junior High or if you'd like to introduce spreadsheets to your elementary students, the following article, "VisiCalc in the Elementary School" by Jean Wilson first appeared in The Computing Teacher. (June, 1985, Vol. 12, No. 9) might provide some instructional ideas for you.

VisiCalc™ in the Elementary School

by
Jean W. Wilson

> ***"Secondary school students have used VisiCalc successfully. But is it too complicated for elementary-grade children? We decided to find out."***

Walk into any business office and you have a good chance of seeing someone using *VisiCalc,*™ a program with great power to provide capabilities normally exercised through use of a pencil, paper and calculator. Because *VisiCalc* gives results accurately, quickly and with great flexibility, it is widely used in business for budgeting and forecasting.

If students could be taught *VisiCalc*, it would permit the exploration of some mathematical relationships and use of formulas and would facilitate decision making and problem solving—the focus of mathematics education in the 1980s. *VisiCalc* would allow students to work with more involved problems, emphasizing the thought process rather than the computation. Students could explore many "what if" situations by changing an entry and quickly seeing the consequences. And students would experience using the computer as a tool in a new way.

Secondary school students have used *VisiCalc* successfully. But is it too complicated for elementary-grade children? We decided to find out.

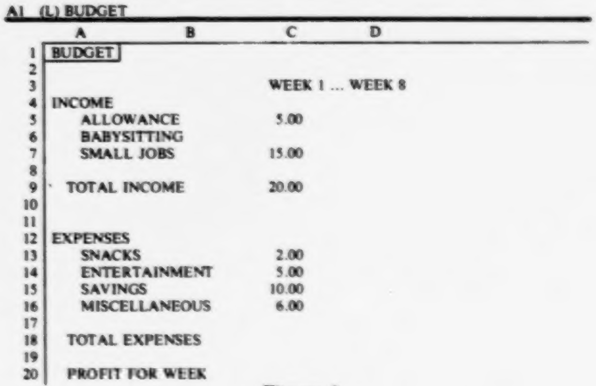
A small group of fifth grade students was selected for an introduction to *VisiCalc* over a three-day period. These students had worked with Logo for about six weeks and were familiar with the Apple computer. They were children of average ability from a very low socio-economic neighborhood.

An Introductory Budget Activity

A simple budget spreadsheet was booted up for each student, and the activities were presented. A cue sheet of keys/commands was developed as a reminder for students as they progressed.

It is necessary to create a pattern, or template, to use *VisiCalc* to solve problems—in this case, a budget template. After such a template is completed for the students, they can begin work.

1. Have students boot the *VisiCalc* disk.
2. Remove the *VisiCalc* disk from the disk drive and insert a storage disk with the budget template on it.
3. Type /SL and then the name of the desired program, in this case, BUDGET. Press RETURN. When the program is loaded, the screen should look like this:



```
A1  (L) BUDGET
         A              B             C           D
  1 |BUDGET|
  2 |
  3 |                              WEEK 1 ... WEEK 8
  4 |INCOME
  5 |    ALLOWANCE                  5.00
  6 |    BABYSITTING
  7 |    SMALL JOBS                15.00
  8 |
  9 | TOTAL INCOME                 20.00
 10 |
 11 |
 12 |EXPENSES
 13 |    SNACKS                     2.00
 14 |    ENTERTAINMENT              5.00
 15 |    SAVINGS                   10.00
 16 |    MISCELLANEOUS              6.00
 17 |
 18 | TOTAL EXPENSES
 19 |
 20 | PROFIT FOR WEEK
```

Figure 1.

The top of the screen has the template title, BUDGET. The cursor is at coordinate A1, where the label "Budget" is at. If the cursor had been at C5, it would be at the value 5.00.

4. Give students practice in moving the cursor to specific coordinates: Move the cursor to A12 by moving the arrow keys or by typing)A12. What information is in that coordinate? Is this entry a label or a value?
5. Have students practice entering data: Enter 12 at C6. What does this do to the entry in C9?
6. Give students practice in changing the data in an entry and predicting what will happen to related coordinates such as C9: Move the cursor to C7 and type in 17. Notice that 17 replaces what was previously in the coordinate. Did this change C9 as predicted?
7. Let students practice writing formulas: Move the cursor to C9. Look at the top line of the screen. The formula +C5+C6+C7, the sum of the values in each coordinate, appears on the top line. The "+" must be typed in front of the letter C to tell *VisiCalc* that this is a value rather than a label. Have students write the formula for the total of the expenses in C18. Be sure the cursor is on C18 when the formula is being written. Now move the

cursor to the coordinate that indicates profits for the week. Let students decide what the formula would be and type it in.

8. Have students move the cursor back to C9 and show how the formula for finding the total can be written using the SUM function by typing @sum (C5 . . . C7) and pressing RETURN. Then have students move the cursor to C18 and let them decide how to use the SUM function to get the desired answer.

If students are working on the concept of percent of increase or decrease, the problem could be expanded by increasing the week's income by 10 percent. An additional column, column D, would be set up to show this increase. Give students an opportunity to experiment and decide what formula to use to obtain the 10 percent increase. If students are concerned only with a 10 percent increase of their total income, a formula can be written in the D9 coordinate. One appropriate formula which students may write is +C9*1.10. Are there other formulas which would produce the same answer?

If a 10 percent increase for each source of income is being considered, the formula, +C5*1.10, can be written in D5 and then the replication command can be utilized to repeat the same formula for all income entries. To utilize the replication command in this example, type /R:D6 . . . D9 and press RETURN. Then type R. Have the students move the cursor to each entry (D5, D6, D7, D8, D9) to read each formula displayed at the top of the screen. Students can practice further by deciding how expenses could be decreased by 20 percent.

Students had no difficulty working with this budget and were eager to include their own entries. After working with the sample budget, they worked individually to make up a personal or a school budget. (The school budgets were extremely interesting!) They easily transferred the skills they had learned. Since their introduction to *VisiCalc* was very limited, there was very little time to develop other activities. However, students learned to use the SUM function, and averaging grades became a fun activity with the AVERAGE function. They became quite proficient with the replication command and were fascinated to learn its use to number the spreadsheet. In short, they found *VisiCalc* enjoyable and challenging.

Integrating *VisiCalc* into the Curriculum

VisiCalc can be a valuable tool in science, mathematics and social studies by developing and reinforcing skills in problem solving, generalizing, predicting, decision making and hypothesizing. Students can gain practice in setting up mathematical formulas, which can be used to find totals, subtotals, differences, percents, etc.; they can predict what would happen if an entry were changed. Deciding which entry to change and how to change it provides practice with decision making.

Science

Here is a problem-solving application in science that gives students experience in making a template and writing formulas. If a faucet drips 10 drops per minute and there are 20 drops per milliliter, what is the capacity of water wasted in one hour? one day? one week? one month?

The labels that could be typed in are:

WATER (IN LITERS) WASTED IN:
Drops mL L Hour Day Week Month

Students could first do the computation to find the answer when the drip is 10 drops per minute. Then they should generalize the problem by writing formulas that could be used for any number of drips. As they determine formulas to obtain other needed information, they continue to reinforce math concepts that have been learned.

Many science problems give students experience in making predictions. For example: If a candle is burned in a one-liter container, how long will the candle burn? What will happen if the size of the container is doubled? tripled?

The experiment should be performed to confirm the prediction; then students can generalize a formula for any size container, and can get the answers almost immediately with *VisiCalc*.

Mathematics

There are many applications in mathematics on the intermediate level. *VisiCalc* can help perform the calculations and make comparisons and generalizations.

- Have students use geoboards to determine the number of diagonals of different polygons and record their findings on the spreadsheet. After they look for patterns, they can generate a formula that can be replicated for any polygon.
- Survey results can be recorded on *VisiCalc*, giving the students opportunities to discover relationships, make hypotheses and reinforce work with percent.
- Skills of finding patterns and generating a formula can be developed in changing degrees Celsius to degrees Fahrenheit, as well as in discovering Time/Rate/Distance relationships.

Social Studies

Here's a *VisiCalc* application for students studying the Pioneer Movement. Assuming settlers had a given amount of money to make the trip, a budget could be made for food, clothing, ammunition, supplies and miscellaneous. Hypothetical actual expenses should be compared with anticipated expenses, and predictions made about how long the money would last. Many "what if . . ." questions can be considered in this and other social studies applications.

VisiCalc As a Management Tool

Record keeping can be a very time-consuming task in an individualized program. With *VisiCalc*, students can keep up with their progress. A template may be made in which individual assignments are listed, with columns for the number of correct responses, number of possible responses and percent of correct responses.

The use of *VisiCalc* in the elementary school can be started on a very simple level, as described here. After students become proficient with the operating skills of *VisiCalc*, however, they should be challenged to identify additional uses for *VisiCalc* to help obtain solutions to problems they may encounter. The potential is great. *VisiCalc*'s built-in functions can provide students with a better understanding of functions; the SUM and AVERAGE functions are well within the grasp of intermediate-grade students, and the knowledge that elementary school students gain in using *VisiCalc* can be applied in many courses as they progress through school. **END** ■

[An excellent book for the student of VisiCalc *is* The VisiCalc Book *by Donald H. Bell (Reston, 1982). The book is written in several editions that are compatible with different computers.*

Jean W. Wilson, School of Education, Trinity University, 715 Stadium Dr., San Antonio, TX 78284.]

Recommended Magazines/Journals

The Computing Teacher

University of Oregon,
1787 Agate St., Eugene,
Oregon, 97403-1923

(503) 686 - 4414
ICCE's CompuServe No.
70014,2117

Teaching And Computers

Scholastic Book Services
123 Newkirk Road,
Richmond Hill, Ontario

(416) 883 - 5300

CRLA - Computers, Reading & Language Arts

Modern Learning Publishing Inc.
6517 Liggett,
Oakland, California
94611

The Journal of Computers In Mathematics and Science Teaching

P.O. Box 4455
Austin, Texas
78765

Popular Computing

Subscription Dept.
P.O. Box 388
Martinsville, N.J.
08836-9964
USA

OR

Personal Computing

P.O. Box 2941
Boulder, Colorado
80321
USA

OR

Creative Computing

P.O. Box 5214
Boulder, Colorado
80321
USA

Turtle News

Young People's Logo Association
1208 Hillsdale Dr.,
Richardson, Tx
75081
USA

MAGAZINES...
FOR YOUR CLASSROOM,
FOR YOU AS A PROFESSIONAL,
FOR YOU AS AN INTERESTED PERSON

AND
FOR YOUR STUDENTS

Moursund, David. Teacher's Guide To Computers In The Elementary School. Eugene, Oregon: International Council For Computers In Education, 1980.

Papert, Seymour. Mindstorms: Children, Computers and Powerful Ideas. New York: Basic Books, 1980.

Turkle, S. The Second Self. New York: Simon and Schuster, 1984.

Watt, D. Learning With Logo. New York, NY: McGraw-Hill, 1983.

Watt, D. Learning With Apple Logo. New York, NY: McGraw-Hill, 1983.

If he can do it, so can you!
#1
Computer Bear
E. Lorenz

RECOMMENDED COMPUTER LITERATURE

This list is drawn from my personal library and consists of books that I have found to be useful in my role as Computer Coordinator There are many other books that are valuable particularly if you're interested in trying to catch and up and keep abreast of the field. Books are constantly becoming outdated as the field grows. Keep watching the literature for recommended books and try to browse through book stores whenever you're visiting a major centre. If you are able to start using a modem you'll have access to interesting articles and research reports.

Babbie, Earl. Apple Logo For Teachers. Belmont, Calif: Wadsworth Publishing Company, 1984

Bear, John. Computer Wimp. Berkley, Calififornia: Ten Speed Press, 1983.

Bearden, Donna. 123, My Computer And Me. Reston, Virginia: Reston Publishing Inc, 1983.

Bearden, Donna. et.al. The Turtle's Sourcebook. Reston, Virginia: Reston Publishing, 1983

Beckelman, L. (Editor). Instructor's Big Book Of Computer Activities. New York, NY: The Instructor Publications, 1984.

Bitter, G. and Camuse, R. Using A Microcomputer In The Classroom. Reston, Virginia: Reston Publishing, 1984.

Carlson, Edward. Kids and The Apple. Reston, Virginia: Reston Publishing, 1983.

Culp, George. An Apple For The Teacher. Monterey, California: Brooks/Coles Publishing, 1983.

Hunter, Beverly. My Students Use Computers. Reston, Virginia, Reston Publishing, 1983.

Recommended Software

Computer Assisted Instruction

☐**Fay: That Math Woman**
Didatech

☐**Mecc Primary**
MECC Product # 731

☐**Rhymes and Riddles**
Spinnaker Software

☐**Stickybears (ABC, Numbers, Opposites)**
Optimum Resource Inc.

Simulations

☐**Science Vol. 3.0 Version 4.5**
MECC Product #707

☐**Elementary Social Studies Vol. 3 Version 4.6**
MECC Product # 704 and #705

☐**Elementary Social Studies Vol.2**
MECC Product # 711

Problem Solving

☐**Incredible Laboratory**
Sunburst Communications

☐**Moptown (Hotel and Parade)**
The Learning Company

☐**Elementary Math Vol. 1 Version 3.4**
MECC Product # 702

Flowcharting

☐ **The Story Tree**
Scholastic Wizware

Logo

☐**Apple Logo**
Logo Computer Systems
☐**E.Z. Logo**
MECC
☐**Terrapin Logo**
Terrapin Inc. or Krell Software
☐**Instant Logo** (Logo Disk #1, 2, or 3)
Public Domain Software
Available through Young People's Logo Association
1208 Hillsdale Dr., Richardson, TX
75081, USA

Word Processing

☐**Applewriter II or IIc**
Apple Inc.
☐**The Print Shop & The Graphics Library**
Broderbund Software
☐**Milliken Word Processing**
Milliken Courseware
☐**The Story Machine**
Spinnaker Inc.
☐**Crossword Magic**
L&S Computerware
☐**The Newsroom**
Springboard Software Inc.

Keyboarding

☐**Superkey**
Bytes of Learning
☐**Typing Tutor**
Microsoft

Spreadsheets

☐**Appleworks**
Apple Inc.

Data Bases

☐**Appleworks**
Apple Inc.
☐**PFS: File**
Personal Software
☐**Mecc Classification**
MECC
☐**Microzine Secret Files Premier Issue**
Scholastic Wizware

Assorted Software

☐**The Puzzler**
Sunburst Communications
☐**Stickbear Reading**
Optimum Learning Inc.
☐**Microzine**
Scholastic Wizware
☐**Facemaker**
Spinnaker Inc.

The above list is a selected list of software that I recommend you purchase. It is by no means exhaustive. Where I have not had personal experience with a piece of software I have NOT recommended it in spite of good reviews. It is up to you and your fellow staff members to build your software library according to your needs. This list is merely to help you ...

get started!